(19) Japan Patent Office (JP)
(12) Publication of Unexamined Patent Application (A)
(11) Japanese Patent Laid-Open Number: Tokkaihei5-323867
(43) Laid-Open Date: Heisei5-12-7 (December 7, 1993)

(51) Int.Cl.[5]	Identification Code	Office Reference Number	FI	Technology manifestation part
G09B 29/00		7143-2C		
H04L 12/24				
12/26				
H04M 3/00		D 8426-5K		
		8529-5K		H04L 11/08

Request for Examination: No request to be done
Number of Claims: 16 (36 pages in total)
Continued to the last page

(21) Application Number: Tokuganhei 4-124430
(22) Filed: Heisei 4-5-18 (May 18, 1992)
(71) Applicant: 000005108
Kabushikikaisha Hitachi Seisakusho
4-6 Kandasurugadai, Chiyoda-ku, Tokyo
(71) Applicant: 000233457
Hitachi Chubu Software Kabushikikaisha
3-10-22 Sakae, Naka-ku, Nagoya-shi, Aichi
(72) Inventor: Yasuhiko Nagai
1099 Ouzenji, Asao-ku, Kawasaki-shi, Kanagawa
c/o Kabusikikaisha Hitachi Seisakusho Systemkaihatsu Kenkyusho
(72) Inventor: Hirotomo Suzuki
3-10-22 Sakae, Naka-ku, Nagoya-shi, Aichi
Hitachi Chubu Software Kabushikikaisha
(74)Agent:Patent Attorney;Shinshirou Arichika
Continued to the last page

Continued from the first page

(51) Int.Cl.[5]	Identification Code	Office Reference Number	FI Technology manifestation part
H04M 3/00	E	8426-5K	

(72) Inventor: Kiminori Sugauchi
1099 Ouzenji, Asao-ku, Kawasaki-shi, Kanagawa
c/o Kabusikikaisha Hitachi Seisakusho Systemkaihatsu Kenkyusho
(72) Inventor: Michio Suzuki
1099 Ouzenji, Asao-ku, Kawasaki-shi, Kanagawa
c/o Kabusikikaisha Hitachi Seisakusho Systemkaihatsu Kenkyusho
(72) Inventor: Masato Saito
5030 Totsukacyou, Totsuka-ku,Yokohama-shi,Kanagawa
c/o Kabushikikaisya Hitachi Seisakusyo Software Koujo

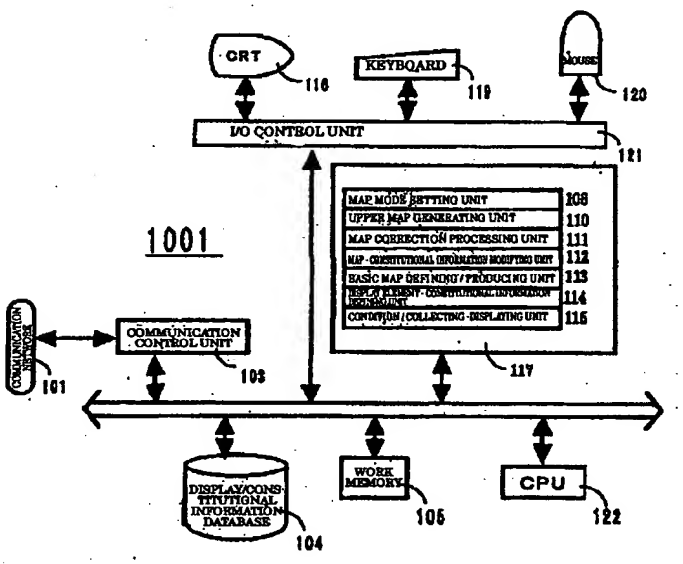
(54) [Title of the Invention] Network Administration Displaying System and Method of the Same

(57) [Abstract]

[Object] To produce a stratified map by which a communication network is geographically grasped easily.

[Constitution] A basic map defining/producing unit (113) for defining/producing a site stratified map by a dialog with a user, the site stratified map respectively displaying units constituting a network, which are substantially located at the same place, as instrument icons on one screen or a plurality of split screens; and an upper map generating unit (110) for generating a stratified map of a level upper than a visual field level thereof, based on the defined / produced basic map, are provided.

CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 1)



[Scope of Claim]

[Claim 1] A network administration displaying system which displays a whole constitution or partial constitution of a communication network on a screen by use of a stratified map stratified in accordance with a geographical/physical visual field level, and which displays a state of the communication network,

the network administration displaying system comprising:

basic map defining/producing means for defining/producing a site stratified map or a stratified map of a level lower than that thereof by a dialog with a user, the site stratified map being a stratified map of a visual field level respectively displaying units constituting a network, which are substantially located at the same place, as instrument icons on one screen or a plurality of split screens; and

upper map generating means for automatically generating a stratified map of a level upper than the visual field level thereof, based on the defined / produced basic map.

[Claim 2] The network administration displaying system according to claim 1, wherein, when a user designates a sort of a communication sub-network, the basic map defining/producing means and the upper map generating means generate a stratified map of the designated communication sub-network.

[Claim 3] The network administration displaying system according to any one of claims 1 and 2,

the network administration displaying system further comprising:

basic constitution defining means for defining a basic constitution of the communication network in association with the definition/production of the basic map.

[Claim 4] The network administration displaying system according to any one of claims 1 to 3,

the network administration displaying system further comprising:

stratified map automatically dividing generating means for dividing the produced or generated stratified map into two or more stratified maps in accordance with a density of constitutional elements of the communication network included in the stratified map.

[Claim 5] The network administration displaying system according to any one of claims 1, 2 and 4, wherein constitutional information of the communication network is previously defined/produced by the basic constitution defining means dialogically, and the basic map defining/producing means is site stratified map

defining/producing means and performs automated layout for an arrangement of the instrument icons, thus automatically generating upper- and lower-level stratified maps.

[Claim 6] The network administration displaying system according to claim 5,

the network administration displaying system further comprising:

instrument icon size automatically adjusting means for automatically adjusting each instrument icon size in accordance with an area of a partition allocated to each instrument icon.

[Claim 7] The network administration displaying system according to any one of claims 1 to 6,

the network administration displaying system further comprising:

constitution defining means for defining the constitutional information dialogically; and

guidance displaying means for guidance-displaying necessary display element group serving as the constitutional information of a map to be produced, information concerning relations among display elements, and map construction supporting information, when the constitutional information entered and defined previously by the constitution defining means is subjected to retrieval·working processing, thus producing each stratified map dialogically on a screen.

[Claim 8] The network administration displaying system according to claim 7, wherein the guidance displaying means guidance-displays link information when other stratified maps having links with a certain stratified map have been already registered.

[Claim 9] The network administration displaying system according to any one of claims 1 to 8, wherein the basic map defining/producing means adds a vendor's name to the instrument icon to display it.

[Claim 10] The network administration displaying system according to any one of claims 1 to 9,

the network administration displaying system further comprising:

map integrating means for collecting a plurality of basic maps of the communication sub-network individually defined/produced and integrating them to generate a basic map of one communication network.

[Claim 11] The network administration displaying system according to any one of claims 1 to 10,

the network administration displaying system further comprising:

map dividing means for dividing the basic map of one communication network to generate a plurality of basic maps of the communication sub-network.

[Claim 12] The network administration displaying system according to any one of claims 1 to 11,

the network administration displaying system further comprising:

multi-window displaying means for displaying two or more site stratified maps, which have links with each other, on a multi-window, and for arranging a link line leading to each of the site stratified maps displayed on other windows so as to position the link line on the side opposite to other windows.

[Claim 13] The network administration displaying system according to any one of claims 1 to 12,

wherein a class information table defining a common property of the constitutional element of the communication network, and a instance information table defining an intrinsic property of the constitutional element of the communication network are provided, and

wherein the basic constitution defining means copies information of the class information table and information of the instance information table, which have been already registered, to generate prototypes of a new class information table and new instance information table, and completes the new class information table and the new instance information table by entering differential information by a user.

[Claim 14] A network administration displaying system, wherein, when a constitutional information and a map of a communication network are defined, the guidance displaying means according to claim 7 is used in a case where a required definition amount is large, and the basic constitution defining means according to claim 3 is used in a case where the required defining amount is small.

[Claim 15] The network administration display system according to claim 1, wherein displaying elements such as symbols and icons expressing a background image of each stratified level and a communication network constitutional element, which are network map constitutional elements, are previously registered on a database; a map production, a constitutional information definition and a linkage between the maps and the constitutional information are performed by means for presenting these display elements as map production parts, means for producing a map by using a part group combinedly, and means for allowing the communication network constitutional information and the displaying information simultaneously

defined to correspond to each other in previously entering the definition and producing the map; in a map construction of a level upper than the site level, the display elements such as the symbols and the icons of an upper level, in which the constitutional elements are grouped, and expressed abstractly, are automatically arranged at proper positions on the background image based on location information in the constitutional information; a production of the geographical and stratified network map of the communication network and a constitutional information definition are executed by means for automatically wiring a link among display elements based on information concerning connection relation in the constitutional information.

[Claim 16] A network administration displaying method which displays a whole constitution or partial constitution of a communication network on a screen by use of a stratified map stratified in accordance with a geographical/physical visual field level, and displays a state of the communication network, wherein display elements expressing a background image of each stratified map and a constitutional element of the communication network are registered on a database previously; the display elements are presented as definition/production parts when a site stratified map which is a stratified map of a visual field level displaying units constituting a network, which are substantially located at the same place, as instrument icons on one screen or on a plurality of split screens, is defined/produced by a dialog with a user; and the stratified map of a level upper than the site stratified map is generated by arranging the display elements on the background image of the stratified map of a level upper than the site stratified map bases on the location information.

[Detailed Description of the Invention]

[0001]

[Field of the Industrial Utilization] The present invention relates to a network administration displaying system and a method of the same. The present invention relates more specifically to a network administration displaying system which displays a whole constitution or partial constitution of a communication network on a screen by use of stratified map in accordance with a geographical/physical visual field level, and which displays a state of the communication network, and a method thereof.

[0002]

[Prior Art] A network administration displaying system displays a constitution of a

communication network and a state thereof by use of a map obtained from the schematizing of the communication network, in order to operate and maintain the communication network effectively. As a technology for producing a map in a conventional network administration displaying system, the ones disclosed in, for example, "IEEE, Network (1988), Pages 29 to 36" and "IEEE, 1998, Network Operations and Management Symposium, 17-3" have been known. These technologies are what generate a circular logical network map in a dialogical or automated manner.

[0003]

[Problems to be Solved by the Invention]

A technology for producing a map in the foregoing conventional network administration displaying system has a problem that it is not suitable for a geographical grasp of the communication network, since it produces a logical network map. In order to improve visibility, a large scale communication network preferably stratifies a map. However, there is a problem that such stratified map cannot be automatically produced. Furthermore, after constitutional information of the communication network, (for example, OSI administration information), and the map are separately defined/produced, the constitutional information of the communication network and the map are required to correspond to each other. Accordingly, there is a problem that the burden on a user on operating it is heavy. Although a definition amount of constitutional information of the communication network and information required for the definition/production of the map changes, depending on a scale of the communication network, a defining/producing method suitable for the definition amount cannot be selected. Accordingly, there is a problem that the workability is low.

[0004] Therefore, an object of the present invention is to provide a network administration displaying system and a method of the same, which can quasi-automatically produce a stratified map making a geographical grasp of the communication network easy, and which can define constitutional information of the communication network and definition/production of the map while allowing them to correspond to each other. Furthermore, the network administration displaying system and the method of the same can select a defining/producing method suitable for the definition amount of required information.

[0005]

[Means for Solving the Problems] In a first point of diagram, the present invention

provides a network administration displaying system which displays a whole constitution or partial constitution of a communication network on a screen by use of a stratified map stratified in accordance with a geographical/physical visual field level, and displays a state of the communication network, the network administration displaying system comprising: basic map defining/producing means for defining/producing a site stratified map or a stratified map of a level lower than that thereof by a dialog with a user, the site stratified map being a stratified map of a visual field level respectively displaying units constituting a network, which are substantially located at the same place, as instrument icons on one screen or a plurality of split screens; and upper map generating means for generating a stratified map of a level upper than the visual field level thereof, based on the defined / produced basic map.

[0006] In a second point of diagram, the present invention provides the network administration displaying system having the above described constitution, which further comprises constitutional information defining means for defining constitutional information of the communication network in association with a definition/production of the basic map.

[0007] In a third point of diagram, the present invention a network administration displaying system, in which when constitutional information of a network is defined, in a case where a required definition amount in an initial definition is large, the constitutional information of the communication network is defined previously by constitutional information defining means, and guidance displaying means for guidance-displaying the constitutional information as map producing guidance is used in producing a stratified map; and in a case where the required definition amount in modifying the constitution in operations is small, the constitutional information defining means for defining the constitutional information of the communication network in association with the definition/production of the basic map is used.

[0008] In a fourth point of diagram, the present invention provides a network administration displaying method which displays a whole constitution or partial constitution of a communication network on a screen by use of a stratified map stratified in accordance with a geographical/physical visual field level, and displays a state of the communication network, wherein display elements expressing a background image of each stratified map and a constitutional element of the communication network are registered on a database previously; the displaying

elements are presented as definition/production parts when a site stratified map which is a stratified map of a visual field level displaying units constituting a network, which are substantially located at the same place, as instrument icons on one screen or on a plurality of split screens, is defined/produced by a dialog with a user; and the stratified map of a level upper than the site stratified map is generated by arranging the display elements on the background image of the stratified map of a level upper than the site stratified map based on the location information which is one of the corresponding constitutional information.

[0009]

[Operation] In the network administration displaying system of the present invention according to the first point of diagram and the network administration displaying system of the present invention according to the fourth point of diagram, the whole constitution or partial constitution of the communication network or the part thereof is displayed on the screen by use of the stratified map stratified in accordance with the geographical/physical visual field level, and the state of the communication network is displayed. The user needs not to define/produce all of such stratified maps, and only have to define/produce the basic map dialogically. The stratified map of a level upper than that thereof is automatically generated. Accordingly, it is possible to produce easily the stratified map making the geographical grasp of the communication network easy.

[0010] In the network administration displaying system of the present invention according to the second point of diagram, the constitutional network of the communication network is defined in association with the definition/production of the basic map. Alternatively, the definition/production of the basic map is executed by using the previously defined constitutional information as the guidance information. Accordingly, it is possible to define the definition/production of the basic map and the constitutional information of the communication network while allowing them to correspond to each other.

[0011] In the network administration displaying system of the present invention according to the third point of diagram, the constitutional information defining means for defining the constitutional information of the communication network in association with the definition/production of the basic map and the guidance displaying means for guidance-displaying the visual field level and the like in producing/generating the stratified map are used separately in accordance with the definition amount. Accordingly, a definition/production method suitable for the

required definition amount of the information can be selected, and efficiency can be increased.

[0012]

[Embodiments] The present invention will be described by embodiments shown in the drawings below in more detail. Note that the present invention is not limited at all by the embodiments.

-First Embodiment-

Fig. 1 is a block diagram showing a network administration displaying system 1001 according to a first embodiment of the present invention. The network administration displaying system 1001 is constituted of a communication control unit 103, a display/constitution information database 104, a work memory 105, a program memory 117, a CRT 118, a keyboard 119, an I/O control unit 121 and a CPU 122. In the program memory 117, a display element/constitutional information defining unit 114, the map mode setting unit 106, a basic map defining/producing unit 113, an upper level generating unit 110, a map correction processing unit 111, a map・constitutional information modifying unit 112, and a condition collecting/displaying unit 115 are stored.

[0013] As described later, by the display element・constitutional information defining unit 114, the map mode setting unit 106, the basic map defining/producing unit 113, the upper map generating unit 110 and the map correction processing unit 111, a stratified map is produced/generated. Furthermore, by the map・constitutional information modifying unit 112, the upper map generating unit 110, and the map correction processing unit 111, the stratified map is modified, and the constitutional information is modified.

[0014] The condition collecting/displaying unit 115 displays the stratified map on the CRT 118. Then, the condition collecting/displaying unit 115 collects condition information of the communication network 101 via the communication control unit 103, and dynamically displays the condition of the communication network 101 on the stratified map. Accordingly, by monitoring the display of the stratified map, it is possible to administrate the condition of the communication network 101.

[0015] Fig. 2 is a flowchart showing processes for defining/producing/generating the stratified map. In Step 201, ① producing/registering of a class information table, ② producing/registering of a display element, and ③ setting/registering of display controlling information are performed by the display element・constitutional information defining unit 114. Herein, the class information table is a

constitutional information table which defines a common property of the constitutional element of the communication network 101. An example is shown in Fig. 3. Furthermore, the display element is a background image of the stratified map, (for example, a Japan map), and a node symbol (including an instrument icon, a site symbol, a main site symbol, and a center site symbol, which are described later), as shown in Fig. 6. Still furthermore, the display controlling information is a display dynamic property of the display element including a display color, presence or absence of a blink, presence or absence of a buzzer sound, and the like, as shown in Fig, 4.

[0016] In the producing/registering of the class information table, a format of the class information table is taken out from the display/constitutional information database 104 to the work memory 105, and the format of the class information table is displayed on the CRT 118. A user sets a definition value for each definition item in the format of the class information table, and produces a class information table 303 as shown in Fig. 3. With respect to the entering of the definition value, a method, in which a definition value is selected by use of a mouse 120 from an attribute reference list 301 for guidance-displaying definition value candidates previously registered, is used, and a method, in which the entering of the definition value is performed from the keyboard 119, is used. For example, in Fig. 3, the definition value <LOCATION address> is selected from the attribute reference list 301. The produced class information table is registered in the display/constitutional information database 104. The production · registration of the class information table is executed for all classes of the constitutional elements of the communication network 101.

[0017] Next, in the producing/registering of the display elements, the user produces the background images for each stratified map by use of a geometric graphics producing function, and a stratification relation between the stratified maps is defined based on a geographical inclusion relation. Then, it is registered in the display/constitutional information database 104. For example, as shown in Fig. 6, a site stratified map uses a constitutional block diagram of the site as the background image, a prefecture stratified map uses a prefecture map as the background image, a local stratified map uses a local map as the background image, and a domestic stratified map uses a map of Japan as the background image. The site stratified map is included in the prefecture stratified map, the prefecture stratified map is included in the local stratified map, and the local stratified map is

included in the domestic stratified map. Note that, it is preferable to provide a world stratified map in the upper stratification of the domestic stratified map, it is preferable to provide an equipment stratified map in the lower layer of the site stratified map, and it is preferable to provide a part stratified map in the lower layer of the equipment stratified map. Furthermore, in the production/registering of the display elements, the user produces a node symbol by use of the geometrical graphics production function, and registers it in the display/constitutional information database 104. For example, the user produces an instrument icon as shown in Fig. 8, and registers it.

[0018] Next, in the setting/registering of the display controlling information, the user sets a display mode of the node symbol expressing a state of the constitutional element of the communication network 101 while diagraming the display controlling information setting screen M1 as shown in Fig. 4, and registers it in the display/constitutional information database 104.

[0019] Returning to Fig. 2, in Step S202, the map mode setting/registering of the stratified map is performed in the map mode setting unit 106. Specifically, the map mode setting screen M2 as shown in Fig. 5 is displayed on the CRT 118, and a value of each setting item which the user sets by use of the mouse 120 and the keyboard 119 is registered in the display/constitutional information database 104. For example, in the setting of Fig. 5, <Site Specification> = all (All Sites are objects to be Displayed), <administration domain> = all)>(All objects to be Administrated are Objects to be displayed), <unit sort> = all (All Instruments are Objects to be displayed), and stratified map of the uppermost level =[domestic]/stratified map of the lowermost level = [Site] (Generate from Domestic Stratified Map to Site Stratified Map). Fig. 6 is a conceptional diagram of the stratified map by the setting of Fig. 5. Note that a network on each stratified map shown in Fig. 6 does not exist at this time. Furthermore, for example, in the setting of Fig. 5, <Site Specification> = Subset (Subset is Object to be displayed), <administration domain> = transmission network (Only Transmission Network is Object to be displayed), <unit sort> =TDM (Only TDM is Object to be displayed), and stratified map of the uppermost level =[Local]/stratified map of the lowermost level =[Site] (Generate from Local Stratified Map to Site Stratified Map) are satisfied. Additionally, the local stratified map and the site stratified map of the transmission network by TDM as a communication sub-network are generated.

[0020] Returning to Fig. 2, in Step 203, the basic map defining/producing unit 113

produces an instance information tables for each constitutional element of the communication network 101. Specifically, when the user designates the class of the constitutional element, the class information table 303 of the class is taken out, and an instance information table 604 shown in Fig. 7 is produced to be displayed. The user enters the definition value of the displayed instance information table 604, which is not set yet, by use of the keyboard 119 or the mouse 120. The user may use the attribute reference list 603 at this time. A default value is set for the definition value dynamically modified in operations. The instance information table 604 for which the definition value is set is registered in the display/constitutional information database 104.

[0021] Returning to Fig. 2, in Step 204, the basic map defining/producing unit 113 produces/registers the site stratified map . First, all of the instance information table 604 in which the definition values of definition items (location address) of the instance information table 604 (see Fig. 7) are equal to each other are taken out. Then, based on the taken-out instance information table 604, a guidance screen M3 for producing a site stratified map as shown in Fig. 8 is displayed. On the side menu, the instrument icon and the definition value of the definition item (ALIAS), which are included in the instance information table 604, are displayed. The user selects the instrument icon from the side menu, and disposes it on a screen for drawing a picture of a constitutional instrument as show in Fig. 9. When the user clicks a button "connection information" with the mouse, the side menu of "information of connecting relations between instrument" is displayed. This side menu of the "information of connecting relations between instruments produced in the form of a table" is prepared based on the definition item <Relation-ship> (information connecting objects to be connected to) included in the instance information table 604. When the user clicks a button "connection" with the mouse, the connection is made based on the definition item (Relation-ship) as shown in Fig. 10. When the site stratified map is passably completed in this way, the basic map defining/producing unit 113 checks the consistency between information, and warns the user to modify the inconsistency when the consistency between the information is not present. If the consistency between the information is present, the site stratified map is registered in the display/constitutional information database 104. The above described processings are executed for all tables of the same instance information table in which the definition values of the definition item (location address) are equal to each other.

[0022] Returning to Fig. 2, in Step 205, the upper level map generating unit 110 retrieves the site stratified map corresponding to the background image of the prefecture stratified map, based the <location address> of the site stratified map. Furthermore, the upper map generating unit 110 retrieves the prefecture stratified map corresponding to the background image of the local stratified map. Additionally, the upper map generating unit 110 retrieves the local stratified map corresponding to the background image of the domestic stratified map. Thus, since the relation between the screens shown in Fig. 11 can be known, a table 1200 showing relations between screens and stratifications shown in Fig. 12 is produced based on it. Furthermore, the upper map generating unit 110 disposes a site symbol representative of the site stratified map on the background image of the prefecture stratified map as shown in Fig. 13. The size of the site symbol is determined in accordance with a scale of the constitutional element included in the site stratified map. The position of the site symbol is determined in accordance with the definition value (latitude and longitude) of (Geographic Coordinate) of the instance information table 604 (see Fig. 7) of the constitutional element included in the site stratified map. Furthermore, as shown in Fig. 14, a table 1400 showing correspondence between site symbols and site stratified maps, in which the site symbols and the site stratified maps are allowed to correspond to each other, is produced, and the table 1400 is registered in the display/constitutional information database 104.

[0023] Retuning to Fig. 2, in Step 206, the upper map generating unit 110 disposes a main site symbol representative of the prefecture stratified map on the background image of the local stratified map. The size of the main site symbol is determine in accordance with the size of the site symbol, which is largest among the site symbols, included in the prefecture stratified map. The position of the main site symbol is determined in accordance with (the latitude and the longitude) of the site symbol having the largest size. Furthermore, a table showing correspondence between the main site symbol and the prefecture stratified map, in which the main site symbol and the prefecture stratified map are allowed to correspond to each other, is produced, and is registered in the display/constitutional information database 104.

[0024] In step 207, the upper map generating unit 110 disposes a center site symbol representative of the local stratified map on the background image of the domestic stratified map. The size of the center site symbol is determined in accordance with

the size of the main site symbol, which is the largest among the main site symbols, included in the local stratified map. The position of the center site symbol is determined in accordance with (the latitude and the longitude) of the main site symbol having the largest size. Furthermore, a table showing correspondence between the center site symbol and the local stratified map, in which the center site symbol and the local stratified map are allowed to correspond to each other, is produced, and is registered in the display/constitutional information database 104.

[0025] In Step 208, the upper map generating unit 110 executes ① the production of an outer link table between the site stratified maps, ② the link processing in the prefecture stratified map, ③ the link processing in the local stratified map, and ④ the link processing in the domestic stratified map. In ① the production processing of the outer link table between the site stratified maps, the instance information table of the instrument, defined in (Relation-ship) of the instance information table corresponding to the instrument on the site stratified map, is retrieved. When there is (local address) included in one instance information table, which does not agree with the other instance information table, it is taken out as an outer link. For example, when an instance information table corresponding to the instrument on the site stratified map is the one denoted by reference numeral 604 in Fig. 7, the instance information table of <JAPAN-Tokyo-PBX-003> defined in (Relation-ship) is retrieved, and when the definition value of <location address> of the instance information table is <Tokyo MARUNOUCHI>, since this definition value does not agree with the definition value <Tokyo OCHANOMIZU> of <location address> of the instance information table 604, this definition value is taken out as an outer link. Then, a table 1701 showing outer link between site stratified maps as shown in Fig. 15 is produced, and it is registered in the display/constitutional information database 104. This processing is executed for all site stratified maps.

[0026] In ② the link processing in the prefecture stratified map, link lines are drawn between the site symbols as shown in Fig. 16, based on a table showing a link between site stratified maps corresponding to the site symbol on the prefecture stratified map. When a link is connected with a site symbol of one of other prefecture stratified maps, the link line is drawn to an end periphery of the map toward a geographic direction of the site symbol of the one of other prefecture stratified maps. Furthermore, a table showing an outer link between the prefecture stratified maps is produced, and registered in the display/constitutional

information database 104. This processing is executed for all prefecture stratified maps.

[0027] In ③ the link processing in the local stratified map, the link line is drawn between the main site symbols, based on the table showing an outer link between the prefecture stratified maps corresponding to the main site symbol on the local stratified map. When the link is made with a main site symbol of one of other local stratified maps, the link line is drawn to an end periphery of the map toward a geographic direction of the main site symbol of the one of other local stratified maps. Furthermore, a table showing an outer link between the local stratified maps is produced, and registered in the display/constitutional information database 104. This processing is executed for all prefecture local maps.

[0028] In ④ the link processing in the domestic stratified map, the link line is drawn between the center site symbols, based on table showing an outer link between the local stratified maps corresponding to the center site symbol on the domestic stratified map.

[0029] In the foregoing production and processing of ① to ④, it is preferable to make different a size, a thickness, a color and a brightness of the symbol and the link line in accordance with the property of the link such as the number of the links, the speed of the link, the sort of the link, the node scale, and the node type.

[0030] Returning to Fig. 2, in Step 209, each of the stratified maps are corrected by a map correction processing unit 111. For example, in the prefecture stratified map of Fig. 17, since it is difficult to see the site symbols (white circles), which were automatically laid out in Step 205, because they are too close to each other. Accordingly, the positions of the site symbols are corrected so as to be seen easily (black circles).

[0031] Fig. 18 is a flowchart showing processes for modifying map·constitutional information. In Step 210, the map · constitutional information modifying unit 112 allows the user to designate a site stratified map to be modified. Then, the site stratified map is read out from the display/constitutional information database 104, and is displayed on the CRT 118 as shown in Fig. 19. When the user clicks a button "instrument added", for example, the map · constitutional information modifying unit 112 reads out tan instrument icon from the display/constitutional information database 104, and displays the instrument icon on the side menu as shown in Fig. 20. When the user selects the instrument icon, which user intends to add, with the mouse, and when the user drags it to dispose it at a desired place,

the added instrument icon is highlight-displayed as shown in Fig. 21, and the instance information table corresponding to the instrument icon is displayed on the side menu. The instrument icon in which its value is determined in the definition item of the instance information table (class ID or the like) and the instrument icon in which its value is not determined therein are displayed with different colors.

[0032] In Step 2102, the user inputs any of the definition value and difference into the undetermined definition item of the instance information table. By the foregoing Step 2101 and Step 2102, the site stratified map and the constitutional information are modified, and registered in the display/constitutional information database 104.

[0033] Step 205 to Step 209 in Fig. 18 are the same as Step 205 to S209 of Fig. 2, and descriptions for them are omitted.

[0034] According to the foregoing network administration displaying system 1001 of the first embodiment, if the user defines the site stratified map as the basic map, the network administration displaying system 1001 generates semi-automatically the prefecture stratified map, the local stratified map and the domestic stratified map, which are ones of a level upper than that thereof. Accordingly, it is possible to reduce the burden on a user. Furthermore, the inconsistency between the stratified maps can be removed. If the site stratified map is modified, it is possible to modify the instance information table in association with the modification of the stratified map. Furthermore, since the network administration displaying system 1001 semi-automatically generates the prefecture stratified map, the local stratified map and the domestic stratified map, which are ones of a level upper than that thereof, in accordance with the modification, it is possible to reduce the burden on a user. Additionally, the consistency between the stratified maps can be removed. Moreover, by using the definition of the site stratified map and the modification thereof separately in accordance with the definition amount, the stratified map can be effectively generated, and the burden on a user can be reduced.

[0035] Furthermore, it is possible to reduce the burden on a user in the point that guidance display, difference input and the like can be used. Moreover, by setting the map mode suitable for the administration range of the user, the stratified map can be effectively generated.

[0036] -Second Embodiment-

Fig. 22 is a block diagram showing an entire network

administration displaying system 1002 according to a second embodiment of the present invention. This network administration displaying system 1002 comprises a unit 110A for automatically dividing and generating an upper map instead of the upper map generating unit in the network administration displaying system 1001 of Fig. 1.

[0037] The unit 110A for automatically dividing and generating an upper map comprises a function of automatically dividing an upper-level stratified map in addition to a function of the upper map generating unit 110 in the network administration displaying unit 1001 in Fig. 1.

[0038] Fig. 23 is a flowchart of a process in which the unit 110A for automatically dividing and generating an upper map divides a prefecture stratified map in accordance with a site density automatically. This process is activated in a process of producing and registering a prefecture stratified map (step 205 in Fig. 2). In step V1, a prefecture stratified map which has been produced in the process of producing and registering a prefecture stratified map is divided into four quadrants as shown in Fig. 24. Returning to Fig. 23, in step V2, it is determined whether or not there is a quadrant having a site density (the number of site symbols in each quadrant) higher than a tolerable site density which has been set empirically in advance. If the quadrant is present, the processing proceeds to step V3. If the quadrant is not present, the processing proceeds to step V4. For example, if the tolerable site density = 4, the forth quadrant where the number of site symbols = 5 is present in Fig. 24. Accordingly, the processing proceeds to step V3.

[0039] In step V3, what is obtained by enlarging each quadrant to a screen size is defined respectively as a new prefecture stratified map once again. However, a quadrant where the number of sites is 0 is deleted). Subsequently, the processing returns to the aforementioned step V1, and the prefecture stratified map which has been defined once again is recursively subjected to the aforementioned process. In step V4, the pre-

divided prefecture stratified map is adopted. Then, the automated division process is completed.

[0040] Fig, 25 is a diagram showing relations between screens and stratifications to be obtained in a case where a prefecture stratified map of Fig. 24 is divided into four and new stratified maps are produced. In addition, Fig. 26 is a table showing relations between screens and stratifications corresponding to Fig. 25. In a table showing correspondence between main site symbols and prefecture stratified maps, one main site symbol ID is allowed to correspond with a plurality of divided prefecture stratified maps. In addition, when displayed, the plurality of divided prefecture stratified maps are scrolled up page by page to be displayed. In a case where a stratified map of a level upper than that of the prefecture stratified map is automatically divided, the processing for this is the same as the aforementioned processing.

[0041] According to the aforementioned network administration displaying system 1002 of the second embodiment, visibility of stratified maps can be improved, since the overcrowding of site symbols, main site symbols, center site symbols is eliminated, while effects brought about by the network administration displaying system 1001 of the first embodiment are maintained.

[0042] -Third Embodiment-

Fig. 27 is a block diagram showing an entire network administration displaying system 1003 according to a third embodiment. This network administration displaying system 1003 comprises a unit 109 for automatically generating a site stratified map in addition to the network administration displaying system 1002 of Fig. 22. The unit 109 for automatically generating a site stratified map performs the processing of automatically generating/registering of a site stratified map to generate a site stratified map from an instance information table automatically.

[0043] Fig. 28 is a flowchart showing the processing of automatically generating/registering a site stratified map. This processing is performed in the place of a process in step 204 of Fig.

2 by the basic map defining/producing unit 113.

[0044] In step U1, a unit 109 for automatically generating a site stratified map groups together instance information tables having the same <locationaddress>s', and combines <ALIAS> = Jm and <Class ID> = Ci of each instance information table in a group Gn (n denotes a group number). In other words, the following is difined:

$Gn = \{ J_{n1} (C_{n1}) , J_{n2} (C_{n2}) , \cdots, \}$

For example, if an instance information table in a group G1 is constituted of TDM [<Alias> = H26, <Class ID> = 3], PBX [<Alias> = X2, <Class ID> = 3], Telephone [<Alias> = TEL1, <Class ID> = 3], FAX [<Alias> = FAX1, <Class ID> = 3] and a large scale computer [<Alias> = A2, <Class ID> = 3], the following is defined

G1 = {H26 (3), X2 (3), TEL1 (3), FAX1 (3), A2 (3)}

[0045] In step U2, the group Gn is filtered by <Class ID>, and a group gn of instrument icons <Alias> corresponding to the group Gn is found. Specifically, <Alias>s' of <Class ID> = 3 are combined.

Gn = { ···, Jm (3), ···, }

For example, in a case of the aforementioned group G1, since what is included is

<Class ID> = 3,

g1 = { H26, X2, TEL1, FAX1, A2 }

is defined.

[0046] In step U3, links among constitutional elements corresponding to <Alias> included in the group gn of instrument icons <Alias> are examined by <Relationship> of the instance information table, <Alias>s' included in the group gn of instrument icons <Alias> are grouped into a sub-group D_0 having a link (outer link) with another group, a sub-group D_1 having a link with constitutional elements of the sub-group D_0, ···, a sub-group D_i having a link with constitutional elements of the sub-group D_{i-1}, and ···, and are allowed to correspond to an instrument icon element $d_{i,j}$. For example, if constitutional elements of the

group G1 has links as shown in Fig. 29,

$D_0 = \{ d_{0.1} = H\ 26 \}$

$D_1 = \{ d_{1.1} = X2,\quad d_{1.2} = A2 \}$

$D_2 = \{ d_{2.1} = TEL1,\quad d_{2.2} = FAX1 \}$

are obtained. $D_{i.j}$ represents an jth instrument icon element of the sub-group D_i.

[0047] In step U4, an instrument icon element $d_{i.j}$ is subjected to weighted calculation concerning a vertical arrangement space. In other words, if the number of an instrument icon element (end node), which is one on a terminal, out of instrument icon elements to be directly or indirectly connected to the side of the counter-outer link of an instrument icon element $d_{i.j}$, is defined as $e_{i.j}$, and if an instrument icon, which is the largest out of the instrument icon sizes of instrument icon elements existing along the passway to the end node, is defined as Imax(i.j), a weight $dW_{i.j}$ concerning a vertical arrangement space corresponding to the instrument icon element $d_{i.j}$ is

$dW_{i.j} = e_{i.j} \times Imax\ (_{i.j}) \times W$

However, W_1 is an empirical constant. In principle, an instrument icon itself is not included in the end node. Nevertheless, when there is no instrument icon element directly or indirectly connected to the side of the counter-outer link of the instrument icon element $d_{i.j}$, the instrument icon itself is made an end node (consequently, $e_{i.j} = 1$. Accordingly, Imax (i.j) is made an instrument icon size of the instrument icon itself).

[0048] For example, in an example of Fig. 29, when instrument icon sizes of the respective instrument icon elements $d_{i.j}$ are defined as I (0.1) = 3, I (1.1) = 3, I (1.2) = 3, I (2.1) = 1 and I (2.2) = 1, and when $W_1 = 1$, the weight $dW_{0.1}$ concerning a vertical arrangement space of an instrument icon element $d_{0.1}$ (TDM/Alias = H26) is Imax = I (1.1) = I (1.2) = 3 at its end node number e = 3($d_{1.2}$, $d_{2.1}$, $d_{2.2}$).

Accordingly, we get

$dW_{0.1} = 3 \times 3 \times 1 = 9$

Similarly, we get

$dW_{1.1} = 2 \times 1 \times 1 = 2$
$dW_{1.2} = 1 \times 3 \times 1 = 3$
$dW_{2.1} = 1 \times 1 \times 1 = 1$
$dW_{2.2} = 1 \times 1 \times 1 = 1$

[0049] In step U5, coordinates for arranging an instrument icon in a site stratified map is calculated. X-coordinate is assigned to a lateral direction, and Y-coordinate is assigned to a vertical direction. The origin of ordinates (X = 0, Y = 0) is placed at the uppermost left in the site stratified map.

«Calculation of X-coordinate of an instrument icon» The lateral width DX of a site stratified map (in practice, the lateral width of a tolerable display space size of a screen) is sectioned off by the number m of sub-groups, and each section is allotted to sub-groups D0, D1, ··· in order from the left. A middle in the lateral direction of each section is defined as X-coordinate GX_i of an instrument icon belonging to sub-groups D_0, D_1, ···. Instrument icons belonging to the same sub-group have the same X-coordinate. In other words, the following is defined:

$GX_i = DX / 2m + (DX / m) \times i$

For example, when DX = 30, since m = 3 in an example of fig. 29, the followings are defined:

$GX_0 = 30/(2 \times 3) + (30 / 3) \times 0 = 5$
$GX_1 = 30/(2 \times 3) + (30 / 3) \times 1 = 15$
$GX_2 = 30/(2 \times 3) + (30 / 3) \times 2 = 25$

[0050] «Calculation of Y-coordinate of an instrument icon» With regard to an instrument icon belonging to a sub-group D_0, a vertical width DY of a site stratified map (in practice, the vertical width of a tolerable display space size of a screen) is sectioned off by a ratio of a weight $dW_{0.j}$ concerning a vertical arrangement space of each instrument icon element $d_{0.j}$ belonging to the sub-group D_0, and each of the instrument icon elements $d_{0.j}$ are allotted to the respective sections in order. Then, a middle in the vertical direction of each section is defined as Y-coordinates $GY_{0.j}$ of the respective instrument icons. In other words, the followings are defined:

$S_{0.j} = DY \times (dW_{0.j} / \Sigma^{k=all} dW_{0.k})$

$GY_{0.j} = \Sigma^{k=j-1} S_{0.k} + S_{0.j} / 2$

For example, when DY = 20, in the example of Fig. 29, the followings are defined:

$S_{0.1} = 20 \times 9/9 = 20$

$GY0.1 = 0 + 20/2 = 10$

[0051] Once a section $S_{i.j}$ concerning each instrument icon element $d_{i.j}$ belonging to a sub-group D_i (however, $i \geqq 0$) is determined, the section $S_{i.j}$ is sectioned off by a ratio of a weight $dW_{i+1.\ n}$ concerning a vertical arrangement space of each instrument icon element $d_{i+1.n}$ belonging to a sub-group D_{i+1} connected directly to the instrument icon element $d_{i.j}$, and each instrument icon element $d_{i+1.n}$ is allotted to each section $S_{i+1.n}$. Then, a middle in the vertical direction of each section is set as Y-coordinate $GY_{i+1.n}$ of each instrument icon. In other words, the followings are defined:

$S_{i+1.n} = S_{i.j} \times (dW_{i+1.n} / \Sigma\, k=^{part1} dW_{i+1.k})$

$GY_{i+1.n} = \Sigma^{k=n-1} S_{i+1.k} + S_{i+1.n} / 2$

Incidentally, $\Sigma^{k=part1}$ represents a sum of a group of instrument icon elements $d_{i+1.n}$ belonging to the sub-group D_{i+1} connected directly to the instrument icon element $d_{i.j}$ of the section $S_{i.j}$. For example, when DY = 20, in an example of Fig. 29, once a section $S_{0.1}$ is determined, the followings are determined:

$S_{1.1} = 20 \times (2/(2+3)) = 8$

$GY_{1.1} = 0 + 8/2 = 8$

$S_{1.2} = 20 \times (3/(2+3)) = 12$

$GY_{1.2} = 8 + 12/2 = 14$

[0052] Furthermore, once a section $S_{1.1}$ is determined, the followings are determined:

$S_{2.1} = 8 \times (1/(1+1)) = 4$

$GY_{2.1} = 0 + 4/2 = 2$

$S_{2.2} = 8 \times (1/(1+1)) = 4$

$GY_{2.2} = 4 + 4/2 = 6$

Fig. 30 is a general explanatory drawing of the aforementioned section $S_{i.j}$ in the vertical direction.

[0053] In step U6, each instrument icon is arranged in accordance with the aforementioned arrangement coordinates. Then, a link between instrument icons is found out of <Relationship> of an instance information table corresponding to each instrument icon, and connection is performed. Incidentally, in an instrument icon having an outer link, an outer link line is drawn in the lateral direction from the instrument icon towards the outer framework of the screen.

[0054] With regard to all the groups Gn which have been obtained in step U1, the aforementioned steps U2 to U6 are performed, thereby obtaining all the site stratified maps. Subsequently, the maps are registered in a display/constitution information database 104. Fig. 31 shows a site stratified map automatically generated with regard to the example of Fig. 29.

[0055] According to the aforementioned network administration displaying system 1003 of the third embodiment, a site stratified map can be automatically generated while the effects brought about by the first and second embodiments are maintained. Accordingly, it is possible to reduce the burden on a user further.

[0056] -Fourth embodiment-

Fig. 32 is a block diagram showing an entire network administration displaying system 1004 according to a fourth embodiment of the present invention. This network administration displaying system 1004 comprises a unit 1091 for automatically adjusting the size of an instrument icon in addition to the network administration displaying system 1003 of Fig. 27. The unit 1091 for automatically adjusting the size of an instrument icon adjusts the size of an instrument icon in a site stratified map when arranging the instrument icons in step U6 of Fig. 28.

[0057] In other words, when the size in the direction of X-axis of the instrument icon of an instrument icon element $d_{i,j}$ is defined as IX (i.j), and the size in the direction of Y-axis thereof is defined as IY (i.j), as well as WX and WY are empirical constants, the size of the instrument icon is adjusted in a way that the following two

equations are satisfied:

$$DX / 2m + WX > IX(i.j) \quad \ldots (1)$$

$$Si.j + WY > IY(i.j) \quad \ldots (2)$$

[0058] For example, when the previously set size of the instrument icon of an instrument icon element $d_{0.1}$ (= H26) is IX (0.1) = 6 and IY (0.1) = 12, if WY =1 and WY = 1, the followings are defined:

$DX / 2m + WX = 30 / (2 \times 3) + 1 = 6$

$S_{0.1} + WY = 20 + 1 = 21.$

Accordingly, IX (0.1)=6 does not satisfy the equation (1). For this reason, all of them is multiplied by 5/6, IX (0.1) = 5 and IY (0.1) = 10 are found. Fig. 33 shows a previously set size of an instrument icon with broken lines, and shows a size of the instrument icon to be obtained after the adjustment with solid lines.

[0059] According to the aforementioned network administration displaying system 1004 of the fourth embodiment, a size of an instrument icon can be adjusted automatically while the effects brought about by the first to third embodiments are maintained. Accordingly, it is possible to reduce the burden on a user further.

[0060] -Fifth Embodiment-

Fig. 34 is a block diagram of an entire network administration displaying system 1005 according to a fifth embodiment of the present invention. This network administration displaying system 1005 comprises a lower map generating unit 1101 in addition to the network administration displaying system of Fig. 32. The lower map generating unit 1101 is what generates and modifies a stratified map of a level lower than that of a site stratified map. As shown in Fig. 35, the lower map generating unit 1101 displays a menu, through which a sort of the stratified map to be generated (an equipment stratified map (equipment diagram), a parts stratified map (parts diagram)) and generation/modification (previous registration, new registration) are selected. In addition, as much information as possible is taken out from an instance information table of the site stratified

map, thereby defining an instance information table of a lower-level stratified map.

[0061] According to the aforementioned network administration displaying system 1005 of the fifth embodiment, a lower-level stratified map can be generated easily while the effects brought about by the first to fourth embodiments are maintained. Accordingly, it is possible to reduce the burden on a user further.

[0062] -Sixth Embodiment-

A network administration displaying system according to a sixth embodiment of the present invention is one to which a function of adding a vendor's name to an instrument icon on a site stratified map and of displaying it is added in the network administration displaying systems of the aforementioned first to fifth embodiments.

[0063] Fig. 36 shows a guidance screen M33 for an instrument icon with a vendor's name. A vendor's name is looked up from <vendor> of an instance information table.

[0064] According to the aforementioned network administration displaying system of the sixth embodiment, a vendor can be identified easily while the effects brought about by the first to fifth embodiments are maintained, thereby enabling a multi-vendor communication network to correspond in a preferable manner.

[0065] -Seventh Embodiment-

Fig. 37 is a block diagram of an entire network administration displaying system 1007 according to a seventh embodiment of the present invention. This network administration displaying system 1007 comprises a unit 107 for integrating a constitution and a map as well as a unit 108 for dividing a constitution and a map in addition to the network administration displaying system 1005 of Fig. 34.

[0066] The network administration displaying system 1007 generates a stratified map concerning a communication sub-network in its charge. The other similar network administration displaying systems generate stratified maps concerning the

respective communication sub-network in their charges. The unit 107 for integrating a constitution and a map in the network administration displaying system 1007 collects information concerning a stratified map with regard to each communication sub-network which has been generated discretely as described above into a display / constitution information database 104. Next, redundant information concerning a site stratified map with regard to each communication sub-network is deleted. In addition, information concerning mutual connections between site stratified maps with regard to each communication sub-network is supplemented to <Relationship> of an instance information table. Subsequently, by this deletion/supplement, a site stratified map concerning a communication network obtained by integrating all the communication sub-networks is generated. In addition, an upper-level stratified map is generated from a stratified map concerning the integrated communication network.

[0067] On the contrary to the aforementioned process, the unit 108 for dividing a constitution and a map extracts an instance information table related to a communication sub-network out of instance information tables concerning a site stratified map of a communication network 2 which has been generated in the network administration displaying system 1007. Next, by a definition value of <Relationship> of the extracted instance information table, information which has nothing to do with the communication sub-network is deleted. Then, by the instance information table to be obtained after this deletion, a site stratified map concerning the communication sub-network is generated. Furthermore, an upper-level stratified map is generated from site stratified map concerning the communication sub-network.

[0068] According to the aforementioned network administration displaying system 1007 of the seventh embodiment, stratified maps of communication sub-networks which have been discretely generated by a plurality of network administration displaying systems are integrated while the effects brought about by the first

to sixth embodiments are maintained, thereby enabling worklord to be dispersed. On the contrary, the generated stratified map concerning a communication network can be divided into stratified maps concerning communication sub-networks, thereby enabling work to be administered in an integrated manner. In addition, by these, work can be performed more efficiently and quickly.

[0069] -Eighth Embodiment-

A network administration displaying system according to an eighth embodiment of the present invention is one to which a function of displaying in a multi-window two site stratified maps linked with each other is added in the network administration displaying systems according to the first to seventh embodiments. For example, in a case where Ochanomize site and Marunouchi site in a prefecture stratified map displayed in a window 1 of Fig. 38 are instructed to be displayed in a multi-window, the site stratified map for Ochanomizu site located relatively in the left on the prefecture stratified map is displayed in a window 2 in the left, and the site stratified map for Marunouchi site located relatively in the right is displayed in a window 3 in the right. At this time, the arrangement of instrument icons and link lines is modified in order that each outer link is directed towards the middle.

[0070] According to the aforementioned network administration displaying system of the eighth embodiment, the position relations and connection relations between the two sites can be visualized clearly while the effects brought about by the first to seventh embodiments are maintained.

[0071]

[Effects of the Invention] According to the network administration displaying system of the present invention and the system thereof, it is possible to produce easily a stratified map making the geographical grasp of a communication network easy. In addition, when a map is defined / produced, constitutional information of the corresponding communication network can be defined simultaneously. Furthermore, a definition/production method suitable for the required definition amount of the

information can be selected, and efficiency can be increased

[Brief Description of the Drawings]

Fig. 1 is a block diagram showing an entire network administration displaying system according to a first embodiment of the present invention.

Fig. 2 is a flowchart showing defining / producing / generating processing of a stratified map according to the network administration displaying system of Fig. 1.

Fig. 3 is a diagram showing an example of a class information table.

Fig. 4 is a diagram showing an example of a display controlling information setting screen.

Fig. 5 is a diagram showing an example of a map mode setting screen.

Fig. 6 is a diagram showing an image of a stratified map.

Fig. 7 is a diagram showing an example of an instance information table.

Fig. 8 is a diagram showing an example of a guidance screen for producing a site stratified map.

Fig. 9 is a diagram showing another example of the guidance screen for producing a site stratified map.

Fig. 10 is a diagram showing yet another example of the guidance screen for producing a site stratified map.

Fig. 11 is a diagram showing an example of relations between screens and stratifications.

Fig. 12 is a diagram showing an example of a table showing the relations between screens and stratifications.

Fig. 13 is a diagram showing an example of correspondence between site symbols and a site stratified map.

Fig. 14 is a diagram showing an example of a table showing correspondence between site symbols and a site stratified map.

Fig. 15 is a diagram showing an example showing a table of an outer link between site stratified maps.

Fig. 16 is a diagram showing an example of a link line in a prefecture stratified map.

Fig. 17 is an explanatory diagram showing a correctional movement in a prefecture stratified map.
Fig. 18 is a flowchart showing processes for modifying a map constitutional information.
Fig. 19 is a diagram showing an example of a site stratified map modifying screen.
Fig. 20 is a diagram showing another example of the site stratified map modifying screen.
Fig. 21 is a diagram showing yet another example of the site stratified map modifying screen.
Fig. 22 is a block diagram showing an entire network administration displaying system according to a second embodiment of the present invention.
Fig. 23 is a flowchart showing automated division processes.
Fig. 24 is a diagram showing an example of the dividing of a map.
Fig. 25 is a diagram showing an example of relations between screens and stratifications appearing when a prefecture stratified map is divided.
Fig. 26 is a diagram showing an example of a table showing relations between screens and stratifications appearing when a prefecture stratified map is divided.
Fig. 27 is a block diagram showing an entire network administration displaying system according to a third embodiment of the present invention.
Fig. 28 is a flowchart showing processes for automatically generating a site stratified map.
Fig. 29 is a diagram showing an example of a site constitution.
Fig. 30 is an explanatory diagram showing a method for dividing an arrangement space.
Fig. 31 is a diagram showing an example of a site stratified map automatically generated.
Fig. 32 is a block diagram showing an entire network administration displaying system according to a fourth embodiment of the present invention.
Fig. 33 is a diagram showing an example of an automated

adjustment of a size of a display icon.

Fig. 34 is a block diagram showing an entire network administration displaying system according to a fifth embodiment of the present invention.

Fig. 35 is a diagram showing an example of a lower map producing guidance screen.

Fig. 36 is a diagram showing an example of a guidance screen for an instrument icon with a vendor's name.

Fig. 37 is a block diagram showing an entire network administration displaying system according to a seventh embodiment of the present invention.

Fig. 38 is a diagram showing an example of a display of a site stratified map in a multi-window.

[Description of Reference Numerals]

1001 Network administration displaying system
1002 Network administration displaying system
1003 Network administration displaying system
1004 Network administration displaying system
1005 Network administration displaying system
1007 Network administration displaying system
101 Communication network
106 Map mode setting unit
107 Unit for integrating a constitution and a map
108 Unit for dividing a constitution and a map
109 Unit for automatically generating a site stratified map
1091 Unit for automatically adjusting a size of an instrument icon
110 Upper map generating unit
110A Unit for automatically dividing and generating an upper map
1101 Lower map generating unit
111 Map correction processing unit
112 Map·constitutional information modifying unit
113 Basic map defining/generating unit
114 Display element · constitutional information defining unit

115 Condition/collecting displaying unit
118 CRT
119 Keyboard
120 Mouse
122 CPU

FIG. 1

CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 1)

101 COMMUNICATION NETWORK
103 COMMUNICATION CONTROL UNIT
104 DISPLAY/CONSTITUTIONAL INFORMATION DATABASE
105 WORK MEMORY
106 MAP MODE SETTING UNIT
110 UPPER MAP GENERATING UNIT
111 MAP CORRECTION PROCESSING UNIT
112 MAP · CONSTITUTIONAL INFORMATION MODIFYING UNIT
113 BASIC MAP DEFINING / PRODUCING UNIT
114 DISPLAY ELEMENT · CONSTITUTIONAL INFORMATION DEFINING UNIT
115 CONDITION / COLLECTING ·DISPLAYING UNIT
119 KEYBOARD
120 MOUSE
121 I/O CONTROL UNIT

FIG. 6

DIAGRAM SHOWING AN IMAGE OF STRATIFIED MAPS (FIG. 6)

DOMESTIC STRATIFIED MAP
LOCAL STRATIFIED MAP
PREFECTURE STRATIFIED MAP
SITE STRATIFIED MAP

FIG. 2

FLOWCHART SHOWING PROCESSES FOR DEFINING / PRODUCING / GENERATING STRATIFIED MAP (FIG. 2)

START
201 PRODUCE / REGISTER CLASS INFORMATION TABLE

PRODUCE / REGISTER DISPLAY ELEMENT
SET / REGISTER DISPLAY CONTROLLING INFORMATION
202 SET / REGISTER MAP MODE
203 PRODUCE INSTANCE INFORMATION TABLE
204 PRODUCE / REGISTER SITE STRATIFIED MAP
205 GENERATE / REGISTER PREFECTURE STRATIFIED MAP
206 GENERATE / REGISTER LOCAL STRATIFIED MAP
207 GENERATE / REGISTER DOMESTIC STRATIFIED MAP
208 LINK MAPS
209 CORRECT MAP
END

FIG. 3
CLASS INFORMATION TABLE DISPLAYING SCREEN (FIG. 3)
DEFINITION ITEMS
CLASS NAME
301 ATTRIBUTE REFERENCE LIST
303 DEFINITION VALUES
304 CLASS ID
SUCCESSION CLASS
305 DEFINITION ATTRIBUTES
ACCEPTED OPERATIONS
CONDITION REPORTS

FIG. 5
MAP MODE SETTING SCREEN (FIG. 5)
ADMINISTRATION DOMAINS
TRANSMISSION NETWORK
EXCHANGE NETWORK
INFORMATION PROCESSING NETWORK
INSTRUMENT TYPES
FIELD-OF-VIEW STRATIFIED LEVELS / TYPES
UPPERMOST LEVELS

LOWERMOST LEVELS

FIG. 4

DISPLAY CONTROLLING INFORMATION SETTING SCREEN(FIG. 4)

FIG. 7

INSTANCE INFORMATION TABLE (FIG. 7)

604 DEFINITION ITEMS

IDENTIFICATION NAME

INSTANCE ID

CLASS ID

UPPER INSTANCE

ATTRIBUTE VALUES

DYNAMIC ATTRIBUTES

STATIC ATTRIBUTES

DEFINITION VALUES

ATTRIBUTE REFERENCE LIST

FIG. 8

GUIDANCE SCREEN FOR PRODUCING SITE STRATIFIED MAP (FIG. 8)

ICON

CONNECTION INFORMATION

CONNECTION

SITE NAME : OCHANOMIZU, TOKYO

SCREEN FOR DRAWING PICTURE OF CONSTITUTING INSTRUMENT

INSTRUMENT ICONS

FIG. 9

GUIDANCE SCREEN FOR PRODUCING SITE STRATIFIED MAP (FIG. 9)

ICON

CONNECTION INFORMATION

CONNECTION
SITE NAME : OCHANOMIZU, TOKYO
SCREEN FOR DRAWING PICTURE OF CONSTITUTING INSTRUMENT
INSTRUMENT ICONS
INFORMATION OF CONNECTING RELATIONS BETWEEN INSTRUMENTS
LINKS INSIDE SITE
LINKS OUTSIDE SITE
OSAKA, OSAKA SITE
MARUNOUCHI, TOKYO SITE

FIG. 12

TABLE SHOWING RELATIONS BETWEEN SCREENS AND STRATIFICATIONS (FIG. 12)
SCREEN A
SCREEN B
SCREEN C
SCREEN D
SCREEN E
SCREEN F
SCREEN G
SCREEN H
SCREEN I
UPPER STRATIFICATION SCREENS

FIG. 15

TABLE SHOWING OUTER LINK BETWEEN SITE STRATIFIED MAPS
CONNECTED FROM:
CONNECTED TO:

FIG.10

GUIDANCE SCREEN FOR PRODUCING SITE STRATIFIED MAP (FIG. 10)

ICON
CONNECTION INFORMATION
CONNECTION
SITE NAME : OCHANOMIZU, TOKYO
SCREEN FOR DRAWING PICTURE OF CONSTITUTING INSTRUMENT
MARUNOUCHI, TOKYO
OSAKA, OSAKA

FIG. 11

EXAMPLE OF RELATIONS BETWEEN SCREENS AND STRATIFICATIONS (FIG. 11)
SCREEN A
JAPAN
SCREEN B
KANSAI DISTRICT
SCREEN C
KANTO DISTRICT
SCREEN D
OSAKA
SCREEN E
KANAGAWA
SCREEN F
TOKYO
SCREEN G
OSAKA SITE
SCREEN H
YOKOHAMA SITE
SCREEN I
TOKYO SITE

FIG. 14

TABLE SHOWING CORRESPONDENCE BETWEEN SITE SYMBOLS AND SITE STRATIFIED MAP (FIG. 14)
PREFECTURE SCREEN

SITE SYMBOL IDS
SITE STRATIFIED MAPS

FIG. 13
CORRESPONDENCE BETWEEN SITE SYMBOLS AND SITE VIEW (FIG. 13)
SCREEN P
OCHANOMIZU (X1, Y1)
MARUNOUCHI (X2, Y2)
SCREEN S1
OCHANOMIZU SITE (X1° E LONGITUDE, Y1° N LATITUDE)
SCREEN S2
MARUNOUCHI SITE (X2° E LONGITUDE, Y2° N LATITUDE)
FIG. 16
(FIG. 16)
OCHANOMIZU
MARUNOUCHI
1802 LINK BY JAPAN-OSAKA-TDM-002
1801 LINK BY JAPAN-TOKYO-PBX-001/002

FIG. 17
(FIG. 17)
CORRECTIONAL MOVEMENT
AUTOMATED LAYOUT

FIG. 18
FLOWCHART SHOWING PROCESSES FOR MODIFYING MAP · CONSTITUTIONAL INFORMATION (FIG. 18)
START
2101 MODIFY / REGISTER SITE STRATIFIED MAP
2102 UPDATE / REGISTER INSTANCE INFORMATION TABLE
205 GENERATE / REGISTER PREFECTURE STRATIFIED MAP
206 GENERATE / REGISTER LOCAL STRATIFIED MAP

207 GENERATE / REGISTER DOMESTIC STRATIFIED MAP
208 LINK MAPS
209 MAP CORRECTION PROCESS
END

FIG. 26

TABLE SHOWING RELATIONS BETWEEN SCREENS AND STRATIFICATIONS (FIG. 26)

SCREEN A
SCREEN C
SCREEN E
SCREEN F1
SCREEN F2
SCREEN F3
SCREEN F4
SCREEN G1
SCREEN G2
SCREEN G3
SCREEN G4
SCREEN G5
SCREEN G6
SCREEN G7
SCREEN G8
SCREEN G9
SCREEN G10
UPPER STRATIFIED SCREENS

FIG. 25

RELATIONS BETWEEN SCREENS AND STRATIFICATIONS APPEARING WHEN PREFECTURE STRATIFIED MAP IS DIVIDED (FIG. 25)

SCREEN C
KANTO DISTRICT
SCREEN E
KANAGAWA

SCREEN F
TOKYO
SCREEN F1
SCREEN F2
SCREEN F3
SCREEN F4
2ND QUADRANT
4TH QUADRANT
1ST QUADRANT
3RD QUADRANT
a9 SITE
a10 SITE
a7 SITE
a1 SITE
a2 SITE
a3 SITE
a4 SITE
a5 SITE
a6 SITE
a8 SITE
SCREEN G1
SCREEN G2
SCREEN G3
SCREEN G4
SCREEN G5
SCREEN G6
SCREEN G7
SCREEN G8
SCREEN G9
SCREEN G10

FIG. 19

EXAMPLE OF SITE STRATIFIED MAP MODIFYING SCREEN (FIG. 19)

INSTRUMENT DELETED

INSTRUMENT CHANGED
INSTRUMENT ADDED
SCREEN FOR DRAWING PICTURE OF CONSTITUTING INSTRUMENT
SITE NAME: OCHANOMIZU, TOKYO
MARUNOUCHI, TOKYO PBX-03
OSAKA, OSAKA TDM-02

FIG. 20
EXAMPLE OF SITE STRATIFIED MAP MODIFYING SCREEN (FIG. 20)
ICON
CONNECTION INFORMATION
CONNECTION
INSTRUMENT ADDED
SCREEN FOR DRAWING PICTURE OF CONSTITUTING INSTRUMENT
SITE NAME : OCHANOMIZU, TOKYO
MARUNOUCHI, TOKYO PBX-03
OSAKA, OSAKA TDM-02
ICONS FOR NEW INSTRUMENTS

FIG. 21
EXAMPLE OF SITE STRATIFIED MAP MODIFYING SCREEN (FIG. 21)
ICON
CONNECTION INFORMATION
CONNECTION
INSTRUMENT ADDED
SCREEN FOR DRAWING PICTURE OF CONSTITUTING INSTRUMENT
SITE NAME : OCHANOMIZU, TOKYO
MARUNOUCHI, TOKYO PBX-03
OSAKA, OSAKA TDM-02
ICONS FOR NEW INSTRUMENTS

V1 DIVIDE PREFECTURE STRATIFIED MAP INTO FOUR QUADRANTS.
V2 WHETHER OR NOT THERE IS QUADRANT WHERE SITE DENSITY ≧ ACCEPTED SITE DENSITY ?
V3 MAKE EACH QUADRANT NEW PREFECTURE STRATIFIED MAP. HOWEVER, DISCARD QUADRANT WHERE NUMBER OF SITES = 0.
V4 USE PRE-DIVIDED PREFECTURE STRATIFIED MAP.
END

FIG. 24
DIVIDING MAP (FIG. 24)
1ST QUADRANT
2ND QUADRANT
3RD QUADRANT
4TH QUADRANT
ORIGIN OF ORDINATES IN SCREEN

FIG. 29
(FIG. 29)
TELEPHONE
LARGE-SCALE COMPUTER

FIG. 27
CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 27)
101 COMMUNICATION NETWORK
103 COMMUNICATION CONTROL UNIT
104 DISPLAY/CONSTITUTIONAL INFORMATION DATABASE
105 WORK MEMORY
106 MAP MODE SETTING UNIT
110A UNIT FOR AUTOMATICALLY DIVIDING AND GENERATING UPPER MAP
111 MAP CORRECTION PROCESSING UNIT
112 MAP · CONSTITUTIONAL INFORMATION MODIFYING

UNIT
113 BASIC MAP DEFINING / PRODUCING UNIT
114 DISPLAY ELEMENT · CONSTITUTIONAL INFORMATION DEFINING UNIT
115 CONDITION COLLECTING / DISPLAYING UNIT
109 UNIT FOR AUTOMATICALLY GENERATING SITE STRATIFIED MAP
119 KEYBOARD
120 MOUSE
121 I/O CONTROL UNIT

FIG. 28
PROCESSES FOR AUTOMATICALLY GENERATING SITE STRATIFIED MAP
(FIG. 28)
START
U1 GROUP INSTANCE INFORMATION TABLES TOGETHER FOR EACH SITE.
U2 PRODUCE GROUP OF INSTRUMENT ICONS.
U3 CLASSIFY INSTRUMENT ICONS
U4 ASSIGN VERTICAL ARRANGEMENT SPACE WEIGHT TO INSTRUMENT ICON.
U5 CALCULATE AXES OF COORDINATES OF ARRANGEMENT OF INSTRUMENT ICON
U6 ARRANGE AND CONNECT AN INSTRUMENT ICON
END

FIG. 31
EXAMPLE OF DISPLAYING LAYOUT FOR AUTOMATICALLY GENERATING SITE STRATIFIED MAP (FIG. 31)
X-DIRECTION
Y-DIRECTION
ORIGIN OF ORDINATES
ACCEPTED AREA FOR DEFINING SCREEN

FIG. 30

METHOD FOR DIVIDING ARRANGEMENT SPACE (Y-AXIS-DIRECTION)

(FIG. 30)

X-DIRECTION

Y-DIRECTION

ACCEPTED AREA FOR DEFINING SCREEN

(NOTES)

FIG. 32

CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 32)

101 COMMUNICATION NETWORK

103 COMMUNICATION CONTROL UNIT

104 DISPLAY/CONSTITUTIONAL INFORMATION DATABASE

105 WORK MEMORY

106 MAP MODE SETTING UNIT

109 UNIT FOR AUTOMATICALLY GENERATING SITE STRATIFIED MAP

110A UNIT FOR AUTOMATICALLY DIVIDING AND GENERATING UPPER MAP

111 MAP CORRECTION PROCESSING UNIT

112 MAP · CONSTITUTIONAL INFORMATION MODIFYING UNIT

113 BASIC MAP DEFINING / PRODUCING UNIT

114 DISPLAY ELEMENT · CONSTITUTIONAL INFORMATION DEFINING UNIT

115 CONDITION COLLECTING / DISPLAYING UNIT

119 KEYBOARD

120 MOUSE

121 I/O CONTROL UNIT

1091 UNIT FOR AUTOMATICALLY REGULATING SIZE OF INSTRUMENT ICON

FIG. 33

EXAMPLE OF ADJUSTING AND ARRANGING THE SIZE OF DISPLAY ICON
(FIG. 33)
X-DIRECTION
Y-DIRECTION
ORIGIN OF ORDINATES
ACCEPTED AREA FOR DEFINING SCREEN

FIG. 35
EXAMPLE OF LOWER MAP PRODUCING GUIDANCE SCREEN
(FIG. 35)
NETWORK ADMINISTRATION
FILE (F)
NETWORK DEFINITION (N)
NETWORK SURVEY (S)
HELP (H)
MENU BAR
CASCADE MENU
PULL DOWN MENU
PREVIOUS REGISTRATION
NEW REGISTRATION

FIG. 34
CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 34)
101 COMMUNICATION NETWORK
103 COMMUNICATION CONTROL UNIT
104 DISPLAY/CONSTITUTIONAL INFORMATION DATABASE
105 WORK MEMORY
106 MAP MODE SETTING UNIT
109 UNIT FOR AUTOMATICALLY GENERATING SITE STRATIFIED MAP
110 UPPER MAP GENERATING UNIT
111 MAP CORRECTION PROCESSING UNIT
112 MAP · CONSTITUTIONAL INFORMATION MODIFYING

DEFINITION ITEMS
IDENTIFICATION NAME
INSTANCE ID
CLASS ID
UPPER INSTANCE
ATTRIBUTE VALUES
DYNAMIC ATTRIBUTES
STATIC ATTRIBUTES
DEFINITION VALUES

FIG. 22

CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 22)

101 COMMUNICATION NETWORK
103 COMMUNICATION CONTROL UNIT
104 DISPLAY/CONSTITUTIONAL INFORMATION DATABASE
105 WORK MEMORY
106 MAP MODE SETTING UNIT
110A UNIT FOR AUTOMATICALLY DIVIDING AND GENERATING UPPER MAP
111 MAP CORRECTION PROCESSING UNIT
112 MAP · CONSTITUTIONAL INFORMATION MODIFYING UNIT
113 BASIC MAP DEFINING / PRODUCING UNIT
114 DISPLAY ELEMENT · CONSTITUTIONAL INFORMATION DEFINING UNIT
115 CONDITION COLLECTING / DISPLAYING UNIT
119 KEYBOARD
120 MOUSE
121 I/O CONTROL UNIT

FIG. 23

FLOWCHART SHOWING AUTOMATED DIVISION PROCESSES (FIG. 23)

START

UNIT
113 BASIC MAP DEFINING / GENERATING UNIT
114 DISPLAY ELEMENT · CONSTITUTIONAL INFORMATION DEFINITION UNIT
115 CONDITION COLLECTING / DISPLAYING UNIT
119 KEYBOARD
120 MOUSE
121 I/O CONTROL UNIT

1091 UNIT FOR AUTOMATICALLY REGULATING SIZE OF INSTRUMENT ICON
1101 LOWER MAP GENERATING UNIT

FIG. 36
EXAMPLE OF GUIDANCE SCREEN FOR INSTRUMENT WITH VENDOR'S NAME
ICON
CONNECTION INFORMATION
CONNECTION
INSTRUMENT ADDED
SCREEN FOR DRAWING PICTURE OF CONSTITUTING INSTRUMENT
SITE NAME : OCHANOMIZU, TOKYO
INSTRUMENT ICONS

FIG. 37
CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 37)
101 COMMUNICATION NETWORK
103 COMMUNICATION CONTROL UNIT
104 DISPLAY/CONSTITUTIONAL INFORMATION DATABASE
105 WORK MEMORY
106 MAP MODE SETTING UNIT
107 UNIT FOR INTEGRATING CONSTITUTION AND MAP
108 UNIT FOR DIVIDING CONSTITUTION AND MAP

109 UNIT FOR AUTOMATICALLY GENERATING SITE STRATIFIED MAP
110A UNIT FOR AUTOMATICALLY DIVIDING AND GENERATING UPPER MAP
111 MAP CORRECTION PROCESSING UNIT
112 MAP · CONSTITUTIONAL INFORMATION MODIFYING UNIT
113 BASIC MAP DEFINING / GENERATING UNIT
114 DISPLAY ELEMENT · CONSTITUTIONAL INFORMATION DEFINING UNIT
115 CONDITION COLLECTING ·DISPLAYING UNIT
119 KEYBOARD
120 MOUSE
121 I/O CONTROL UNIT
1091 UNIT FOR AUTOMATICALLY ADJUSTING SIZE OF INSTRUMENT ICON
1101 LOWER MAP GENERATING UNIT

FIG.38
EXAMPLE OF DISPLAYING SITE VIEW WINDOW
ORIGIN OF ORDINATES
WINDOW 1
OCHANOMIZU (X1=7)
MARUNOUCHI (X2=8)
OCHANOMIZU SITE
WINDOW 2
MARUNOUCHI SITE
WINDOW 3

Fig.1

CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 1)

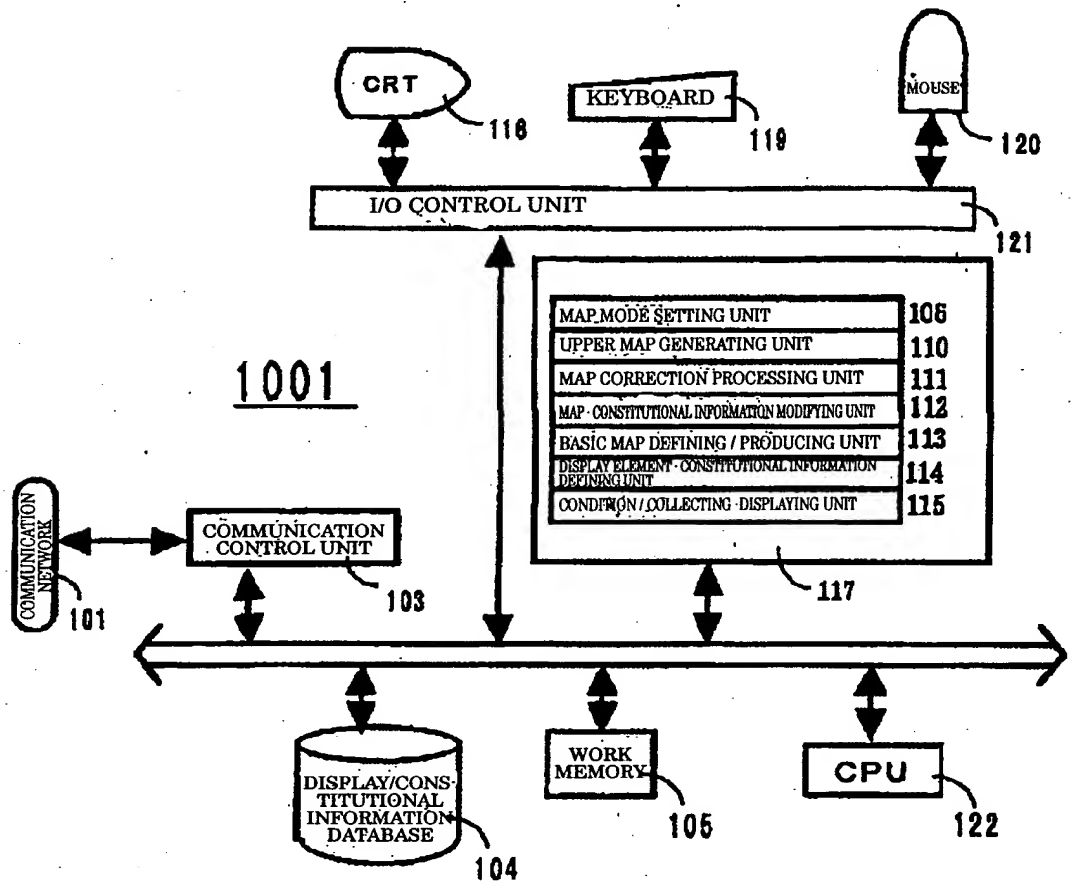


Fig.6

DIAGRAM SHOWING AN IMAGE OF STRATIFIED MAPS (FIG. 6)

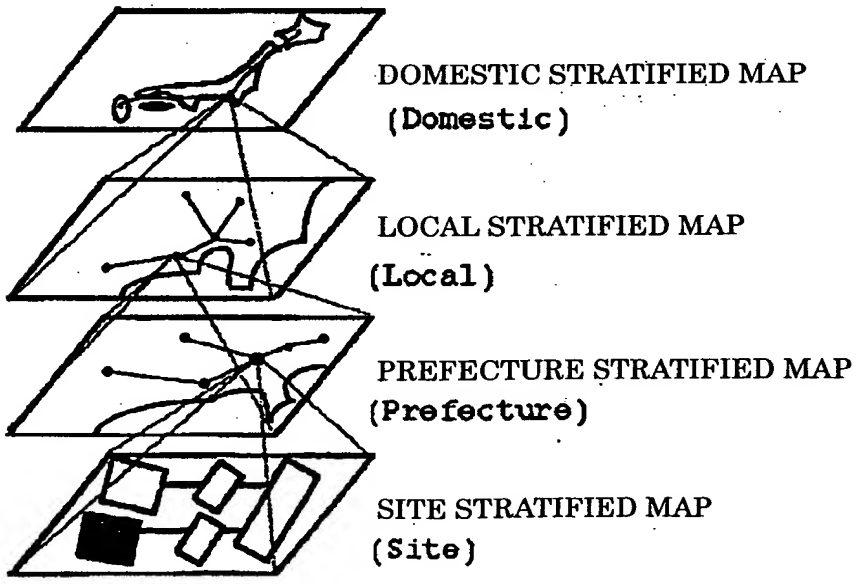


Fig.2

FLOWCHART SHOWING PROCESSES FOR DEFINING / PRODUCING / GENERATING STRATIFIED MAP (FIG. 2)

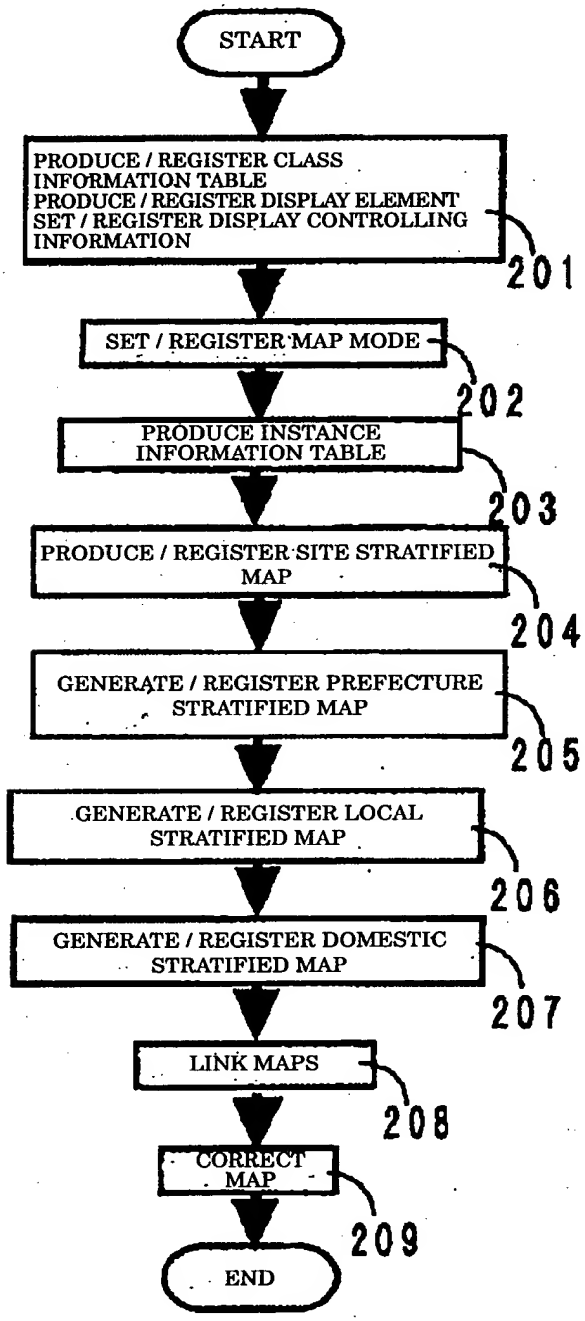


Fig.3

CLASS INFORMATION TABLE DISPLAYING SCREEN (FIG. 3)

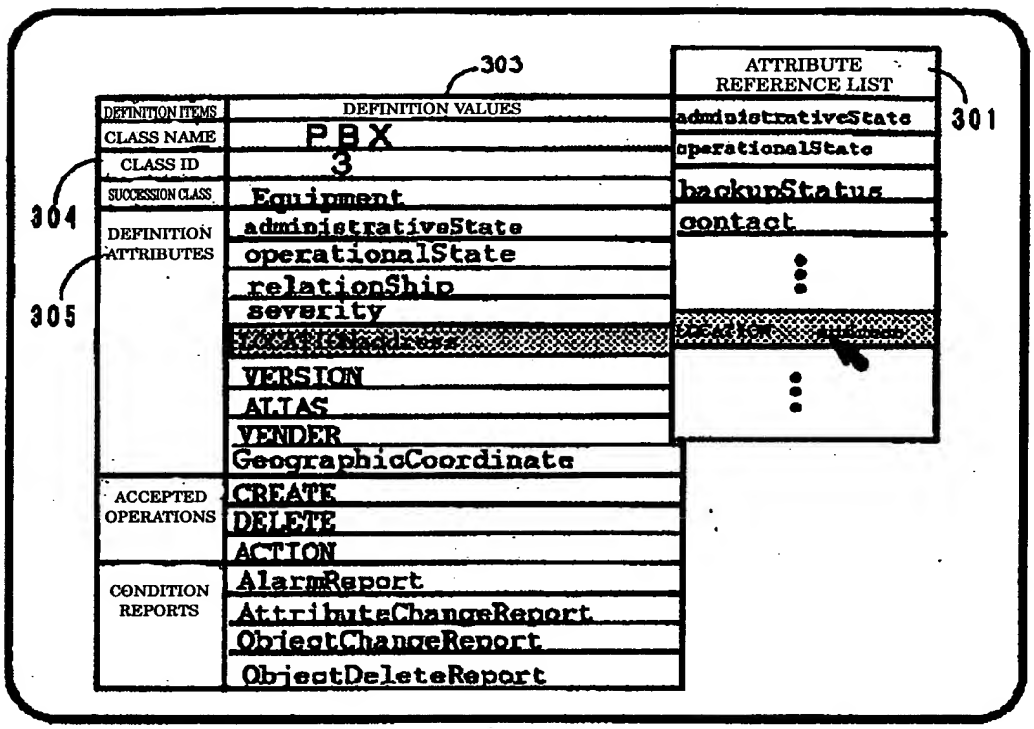


Fig.5

MAP MODE SETTING SCREEN (FIG. 5)

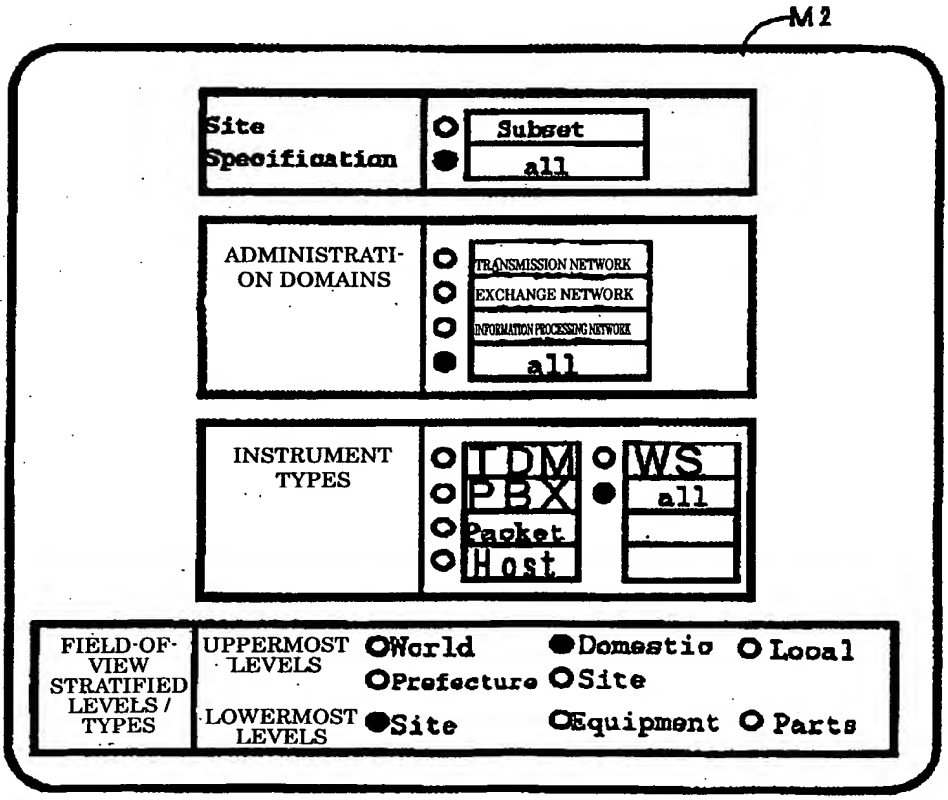


Fig.4

DISPLAY CONTROLLING INFORMATION SETTING SCREEN(FIG.4)

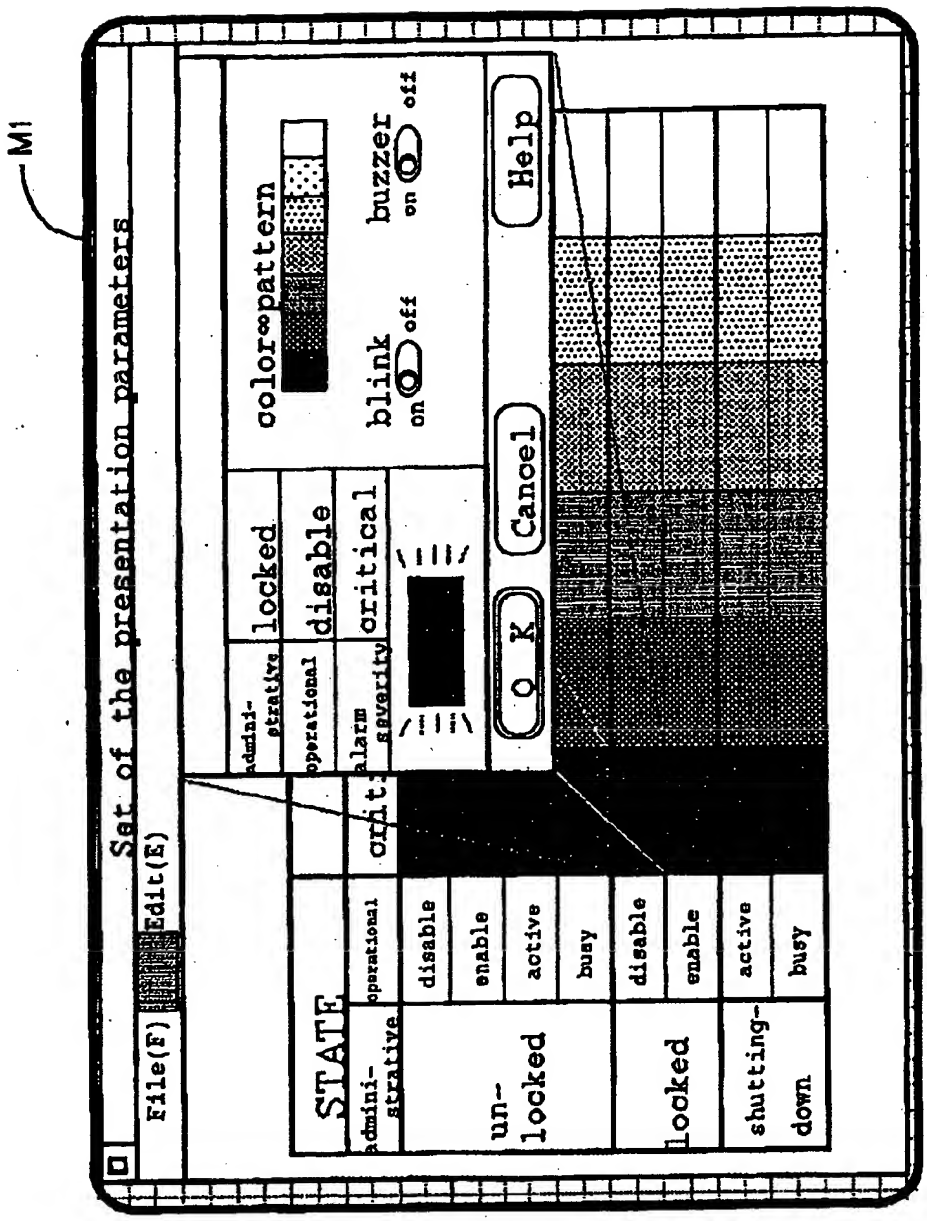


Fig.7

INSTANCE INFORMATION TABLE (FIG. 7)

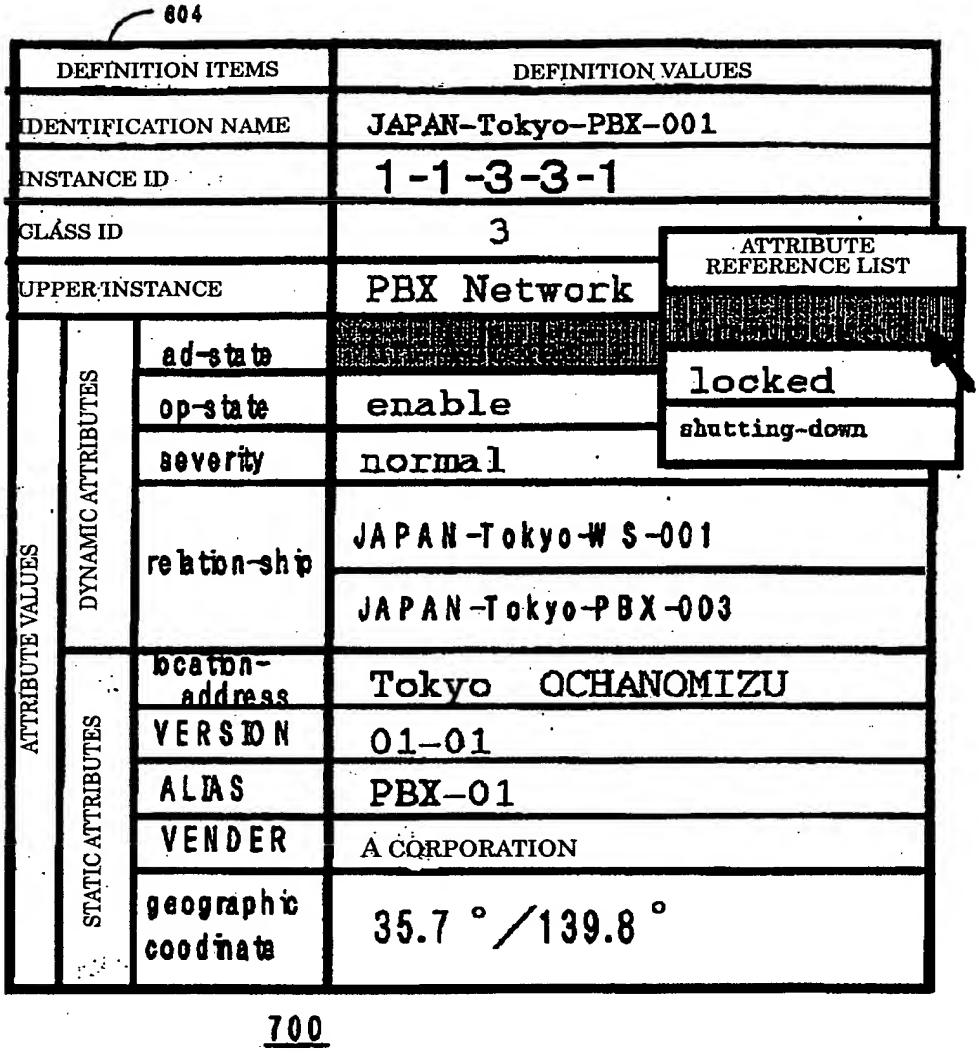


Fig.8

GUIDANCE SCREEN FOR PRODUCING SITE STRATIFIED MAP (FIG. 8)

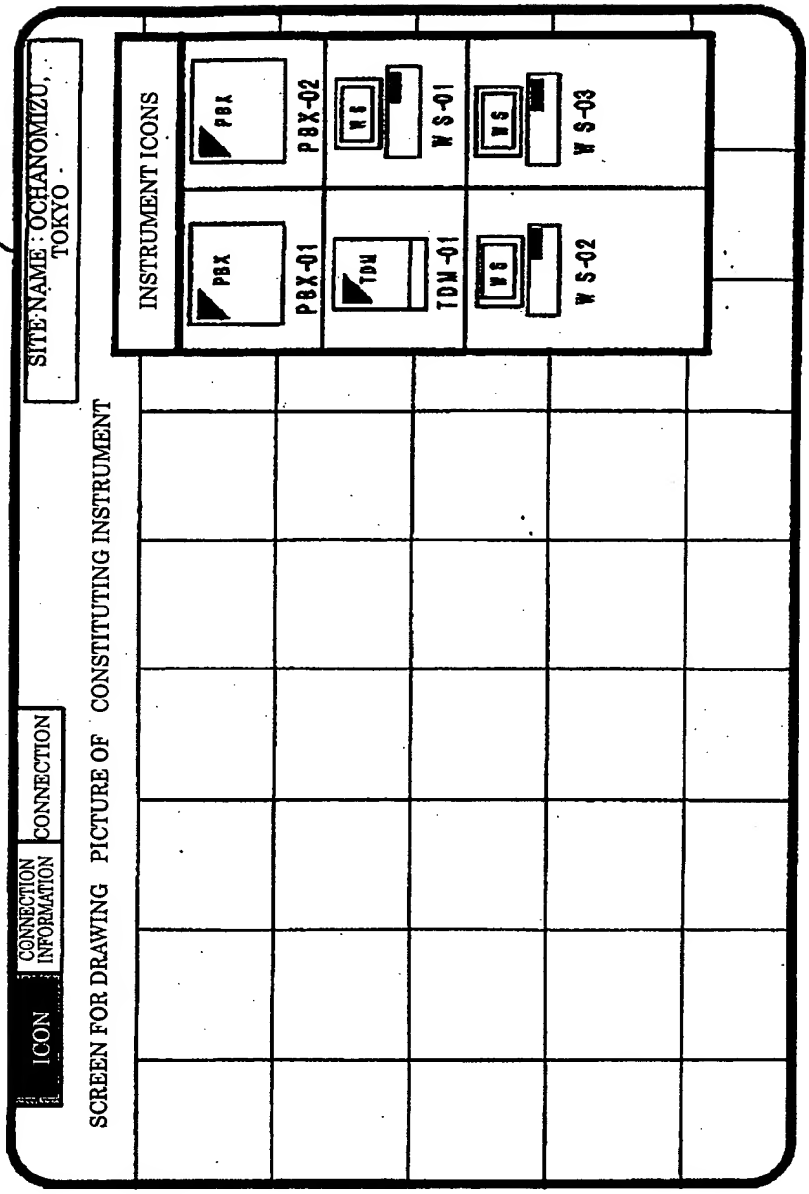


Fig.9

GUIDANCE SCREEN FOR PRODUCING SITE STRATIFIED MAP (FIG. 9)

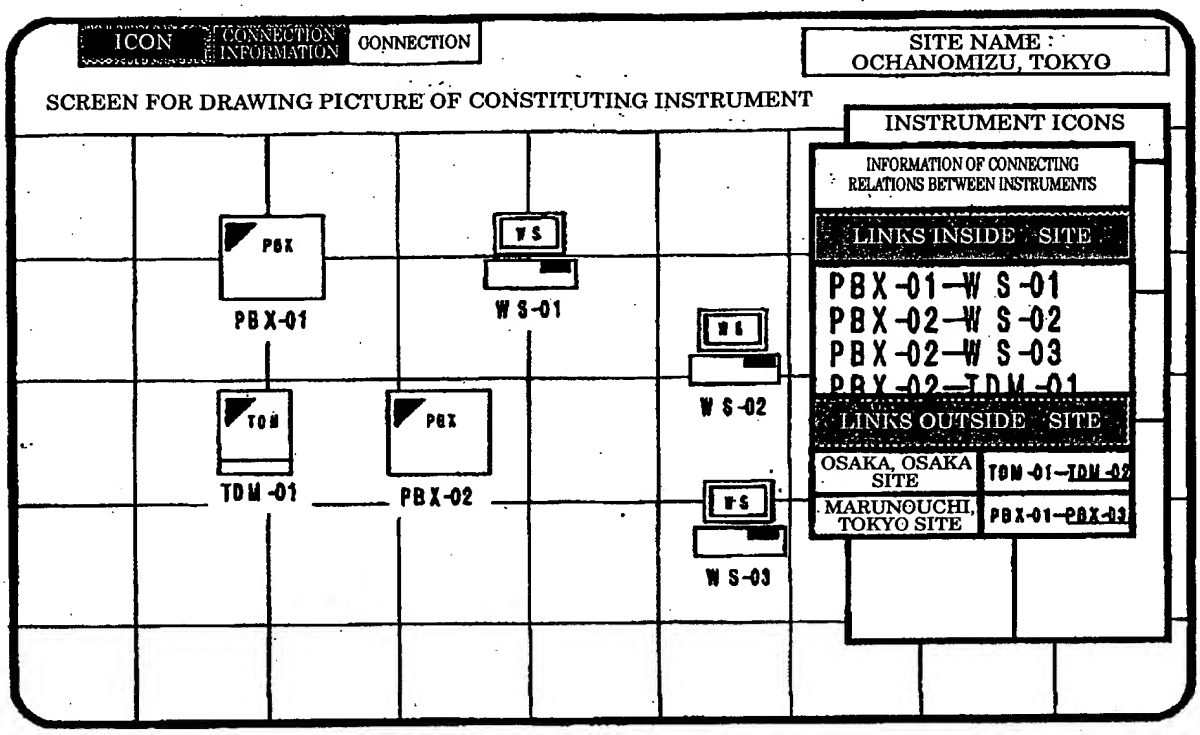


Fig.12

TABLE SHOWING RELATIONS BETWEEN SCREENS AND STRATIFICATIONS (FIG. 12)

1200

	UPPER STRATIFICATION SCREENS
SCREEN A	—
SCREEN B	A
SCREEN C	A
SCREEN D	B
SCREEN E	C
SCREEN F	C
SCREEN G	D
SCREEN H	E
SCREEN I	F

Fig.15

TABLE SHOWING OUTER LINK BETWEEN SITE STRATIFIED MAPS

1701

Location-address	Tokyo. OCHANOMIZU
CONNECTED FROM:	CONNECTED TO:
JAPAN-Tokyo-TDM-001	JAPAN-Osaka-TDM-002

Fig.10

GUIDANCE SCREEN FOR PRODUCING SITE STRATIFIED MAP (FIG. 10)

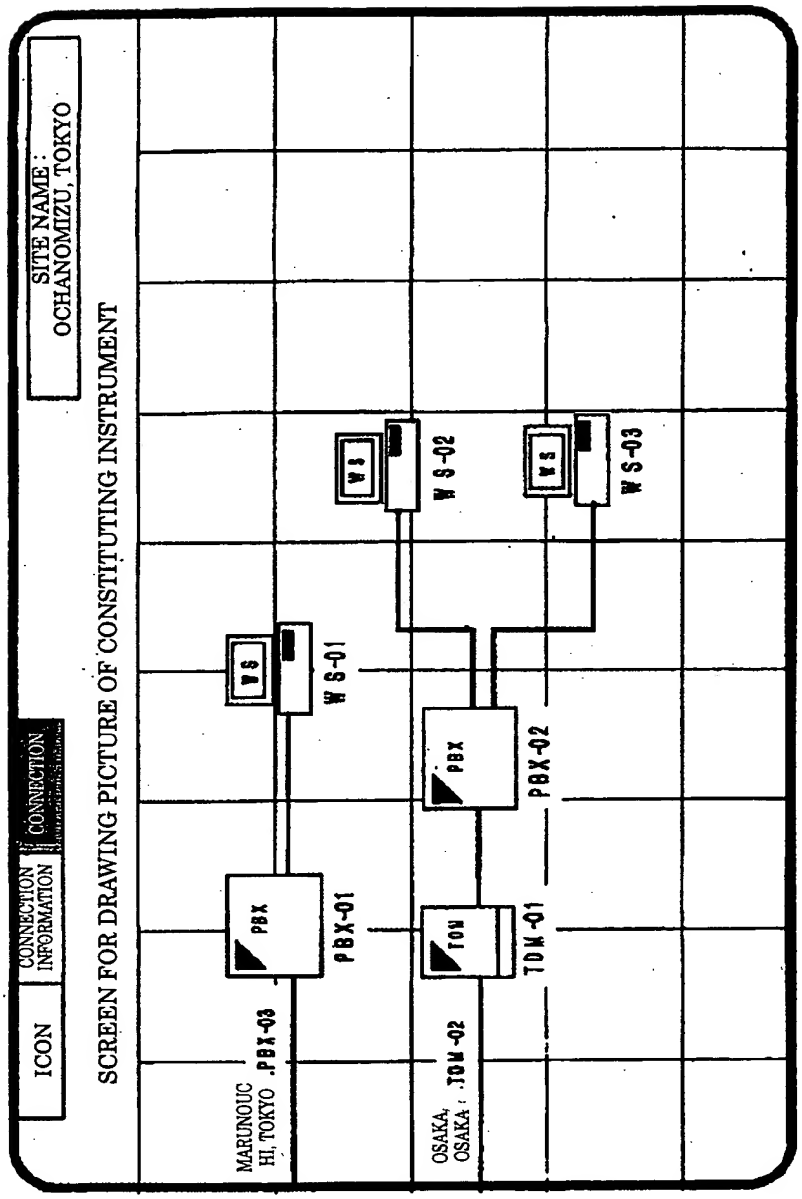


Fig.11

EXAMPLE OF RELATIONS BETWEEN SCREENS AND STRATIFICATIONS (FIG. 11)

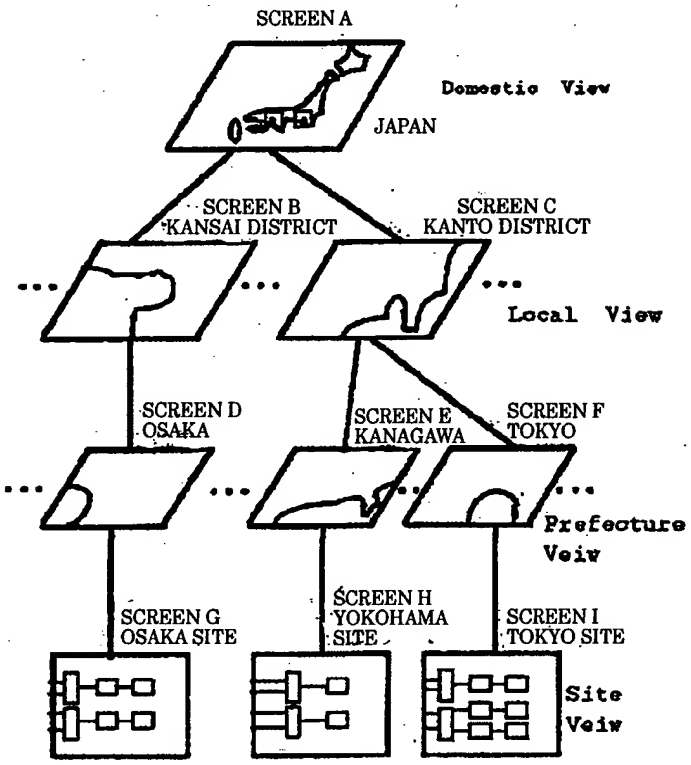


Fig.14

TABLE SHOWING CORRESPONDENCE BETWEEN SITE SYMBOLS AND SITE STRATIFIED MAP (FIG. 14)

1400

Prefecture SCREEN	P
SITE SYMBOL IDS	SITE STRATIFIED MAPS
PW1	S1
PN2	S2
•	•
•	•
•	•
•	•

Fig.13

CORRESPONDENCE BETWEEN SITE SYMBOLS AND SITE VIEW (FIG. 13)

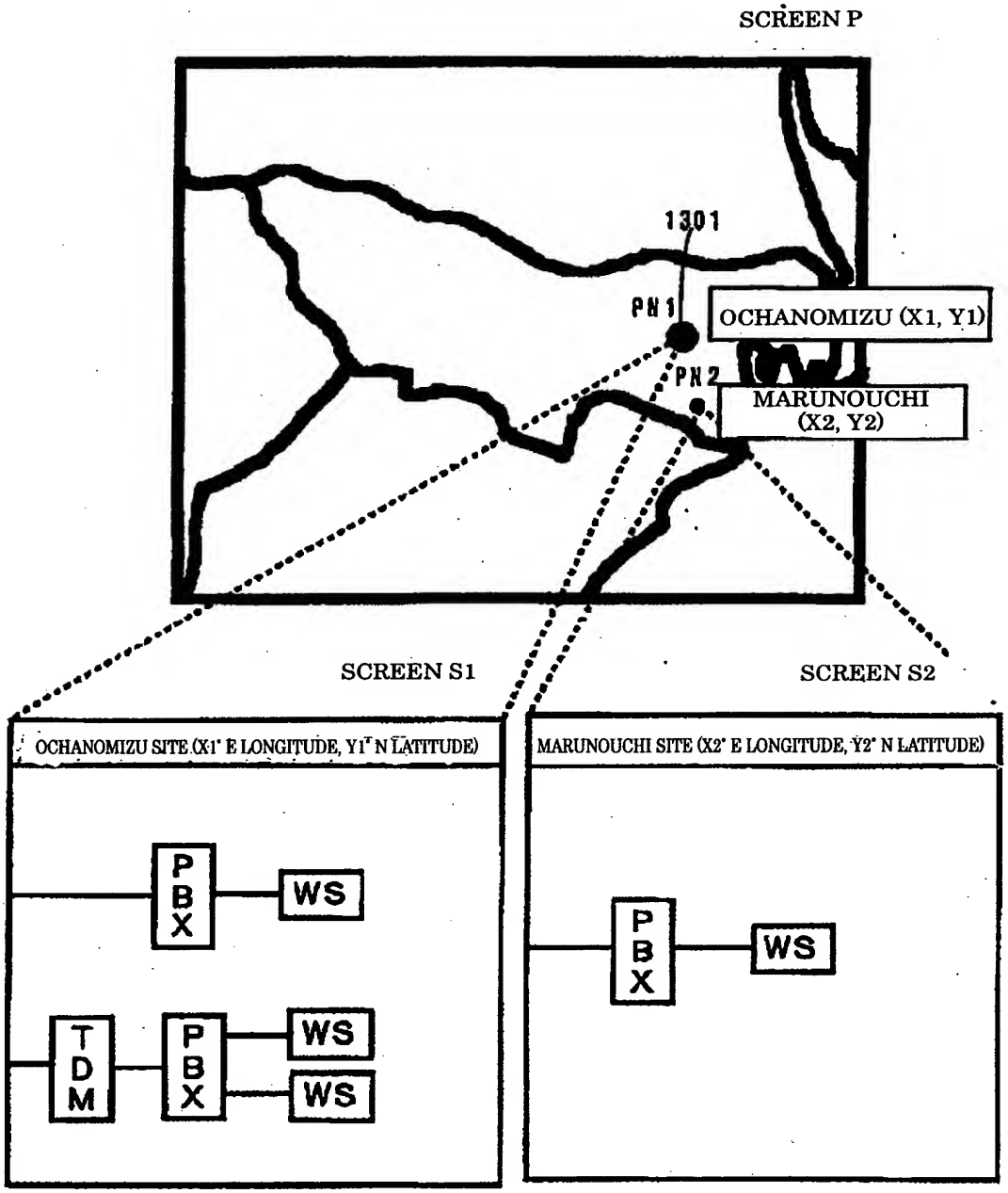


Fig.16

(FIG. 16)

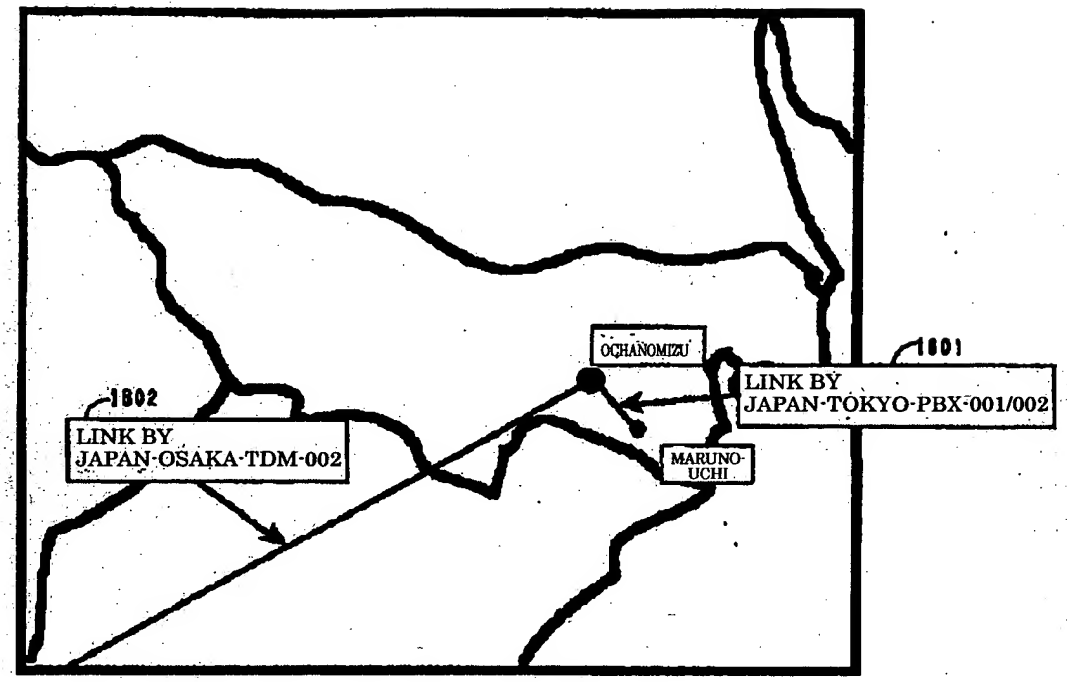


Fig.17

(FIG. 17)

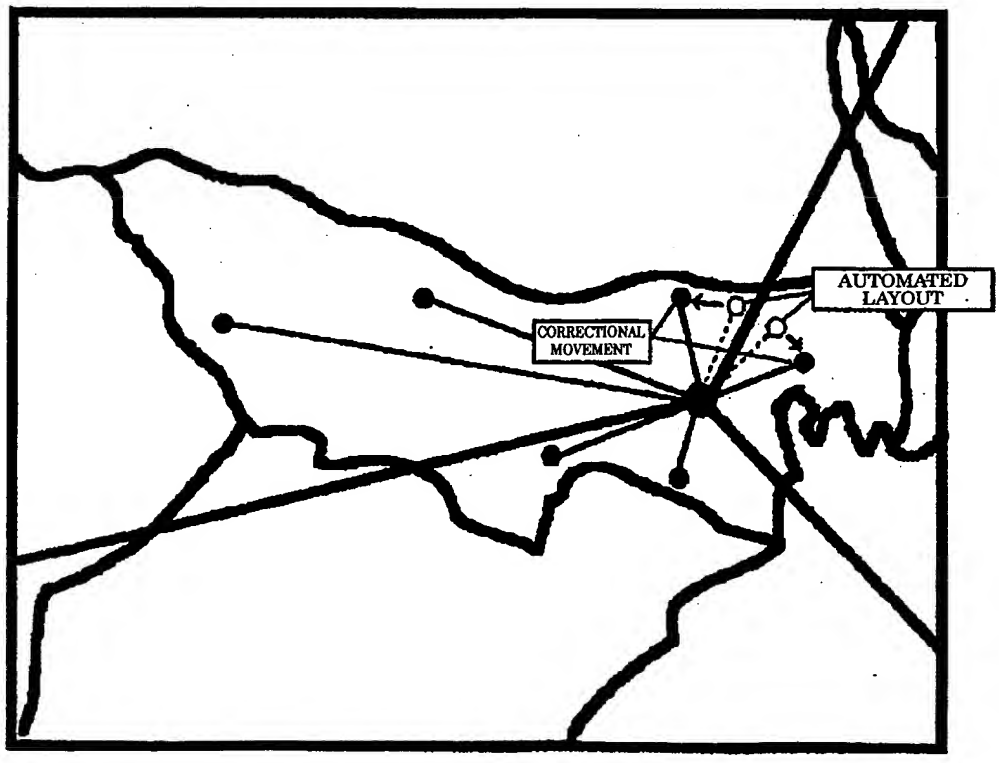


Fig.18

FLOWCHART SHOWING PROCESSES FOR MODIFYING MAP ·CONSTITUTIONAL INFORMATION (FIG. 18)

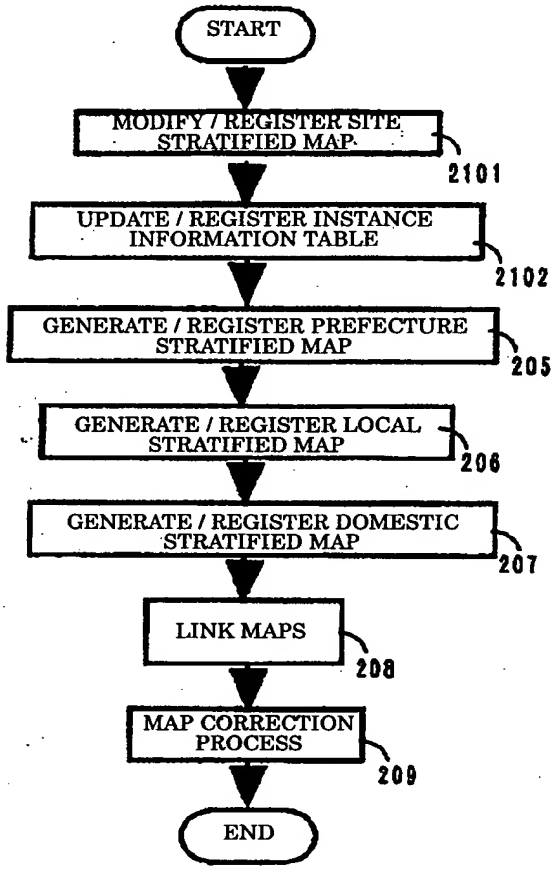


Fig.26

TABLE SHOWING RELATIONS BETWEEN SCREENS AND STRATIFICATIONS (FIG. 26)

2600

	UPPER STRATIFIED SCREENS
SCREEN A	——
SCREEN C	A
SCREEN E	C
SCREEN F1	C
SCREEN F2	C
SCREEN F3	C
SCREEN F4	C
SCREEN G1	F 1
SCREEN G2	F 1
SCREEN G3	F 1
SCREEN G4	F 2
SCREEN G5	F 2
SCREEN G6	F 2
SCREEN G7	F 2
SCREEN G8	F 2
SCREEN G9	F 3
SCREEN G10	F 3

Fig.25

RELATIONS BETWEEN SCREENS AND STRATIFICATIONS APPEARING WHEN PREFECTURE STRATIFIED MAP IS DIVIDED (FIG. 25)

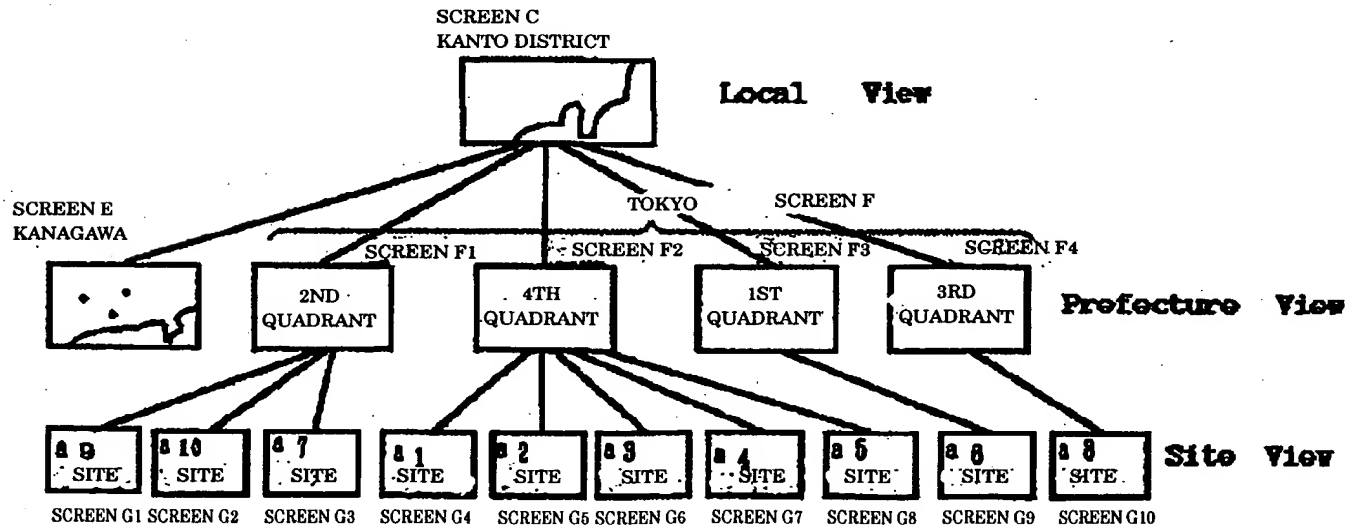


Fig.19

EXAMPLE OF SITE STRATIFIED MAP MODIFYING SCREEN (FIG. 19)

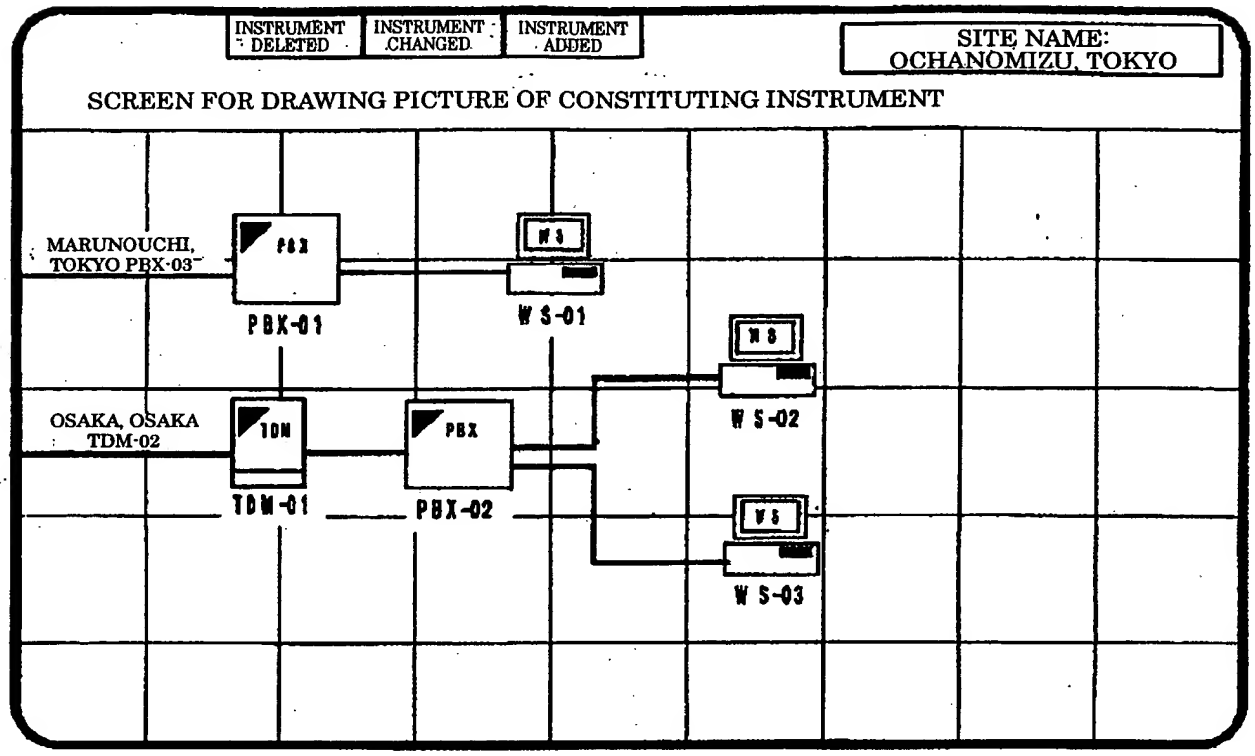


Fig.20

EXAMPLE OF SITE STRATIFIED MAP MODIFYING SCREEN (FIG. 20)

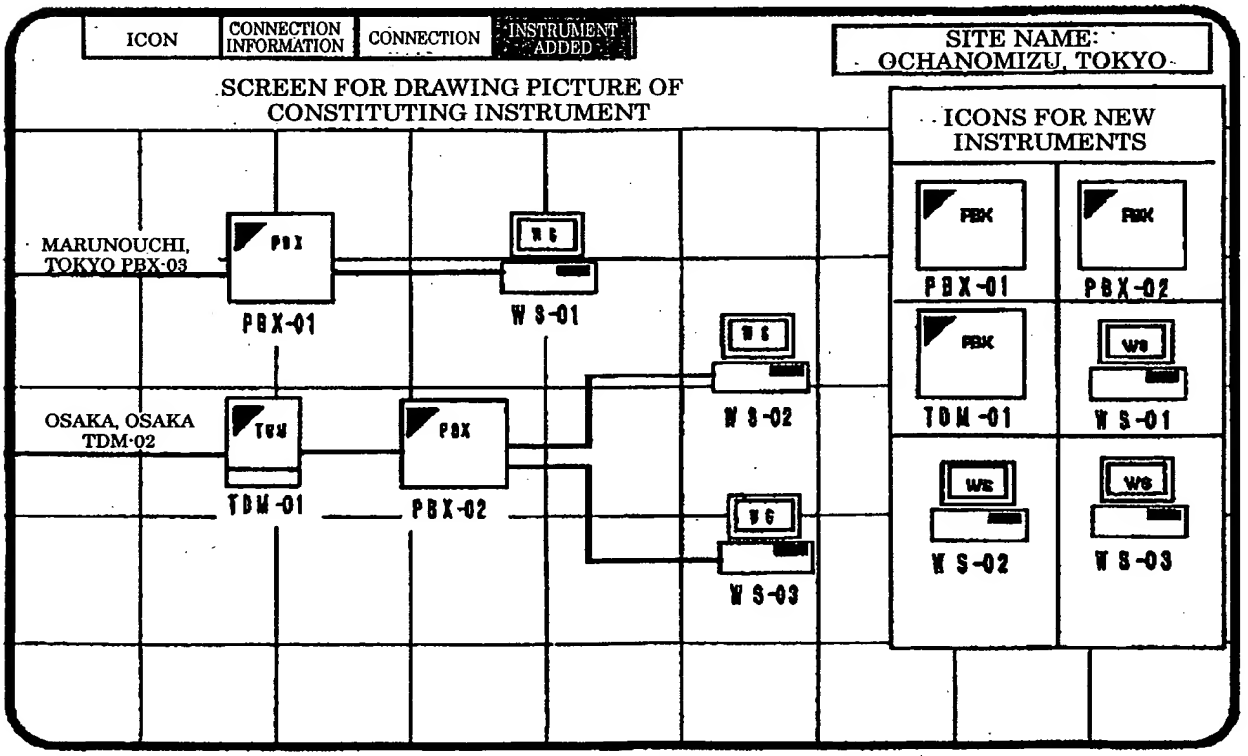


Fig.21

EXAMPLE OF SITE STRATIFIED MAP MODIFYING SCREEN (FIG. 21)

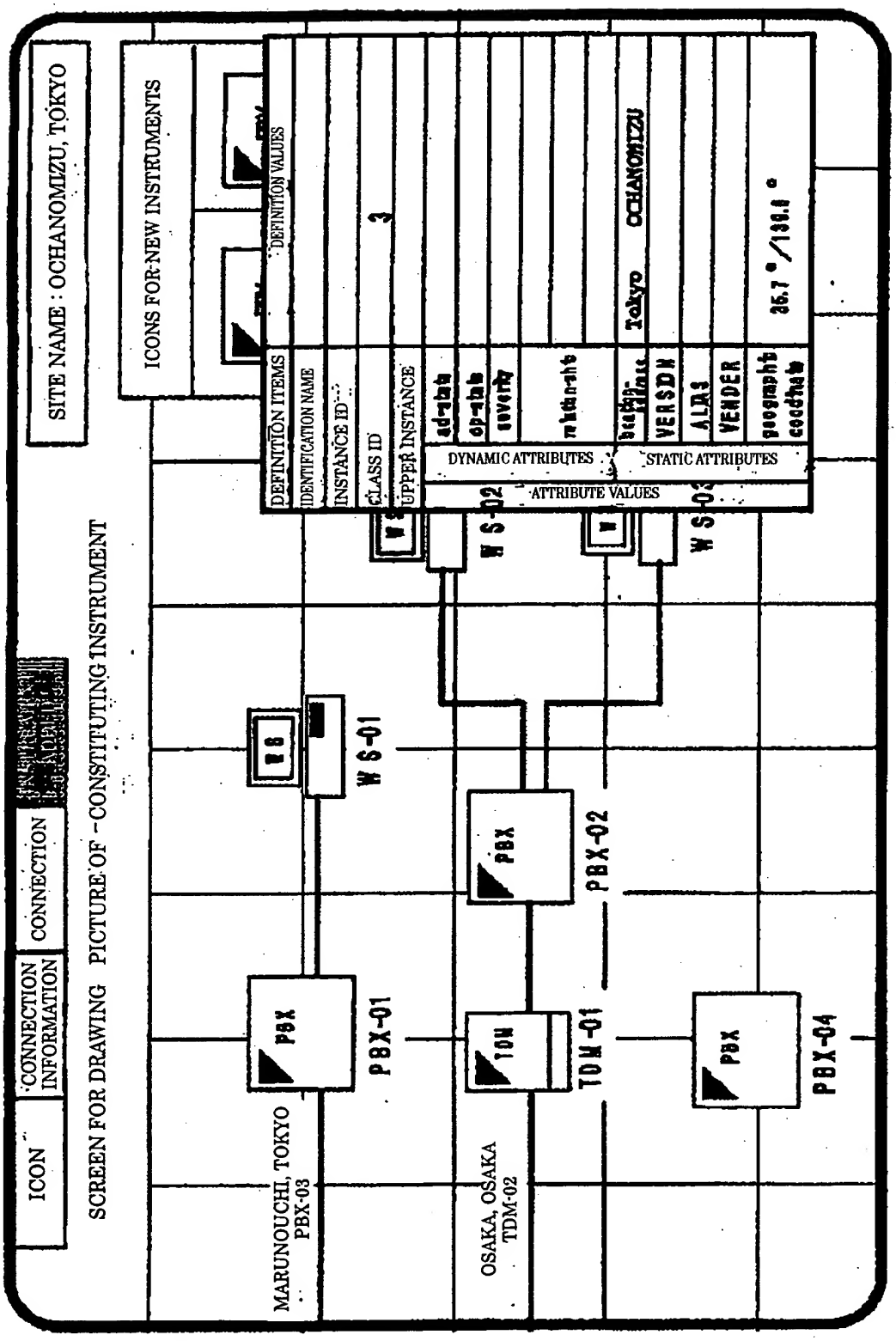


Fig.22

CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 22)

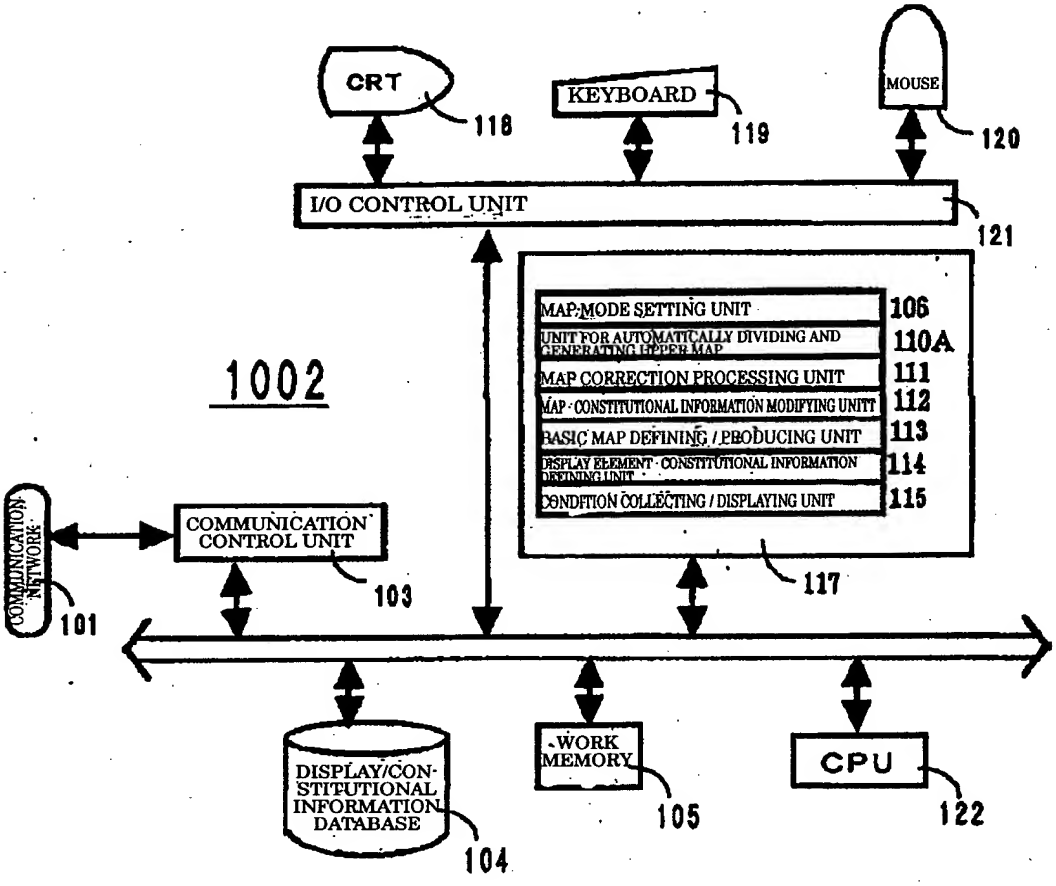


Fig.23

FLOWCHART SHOWING AUTOMATED DIVISION PROCESSES (FIG. 23)

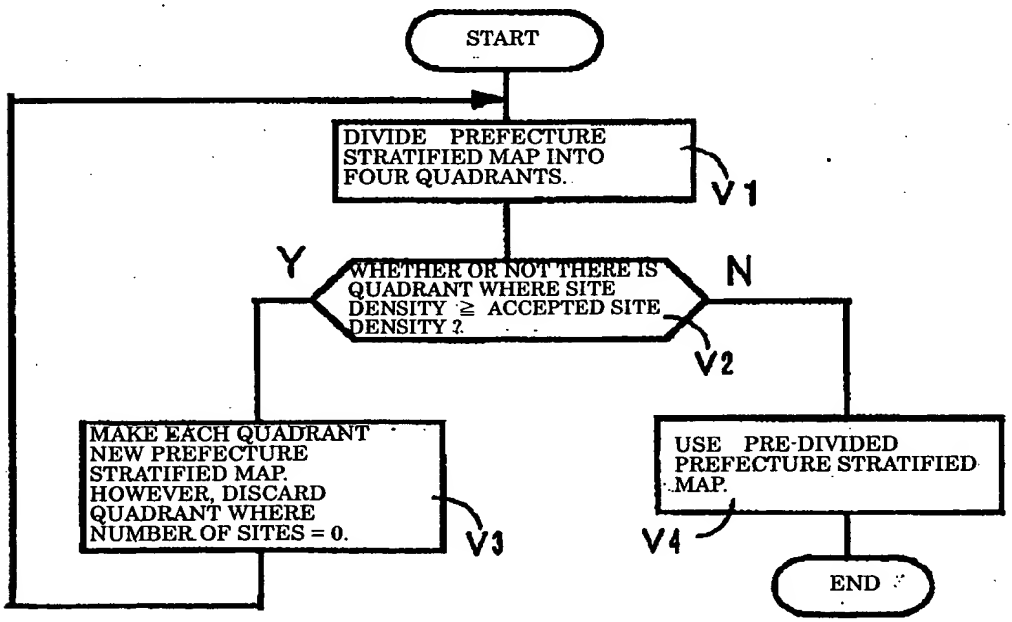


Fig.24

DIVIDING A MAP (FIG. 24)

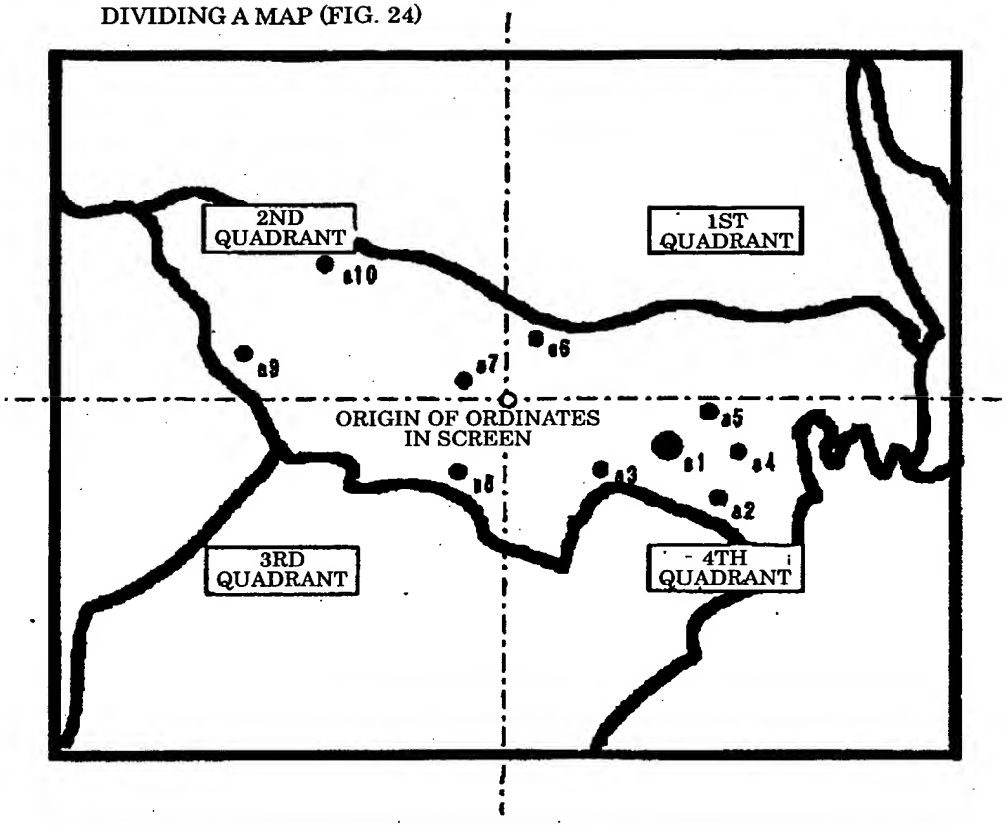


Fig.29

(FIG. 29)

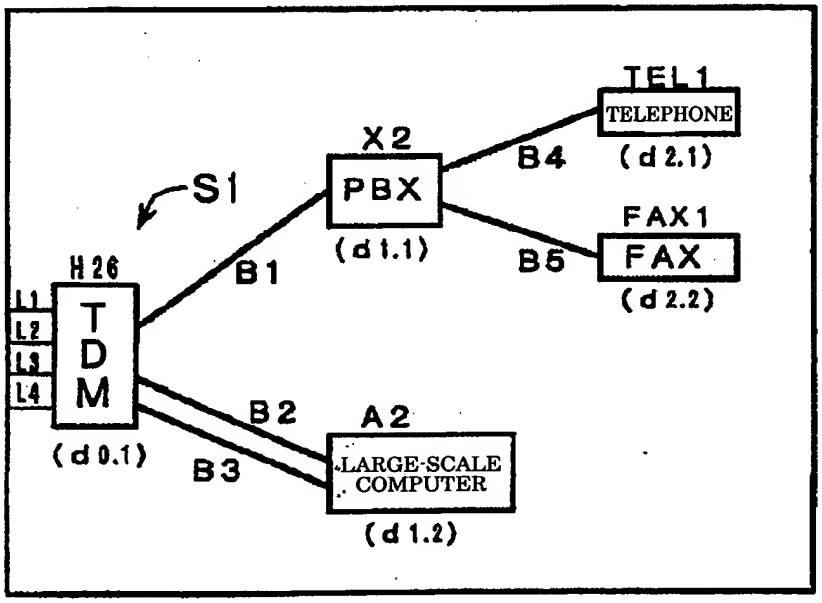


Fig.27

CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 27)

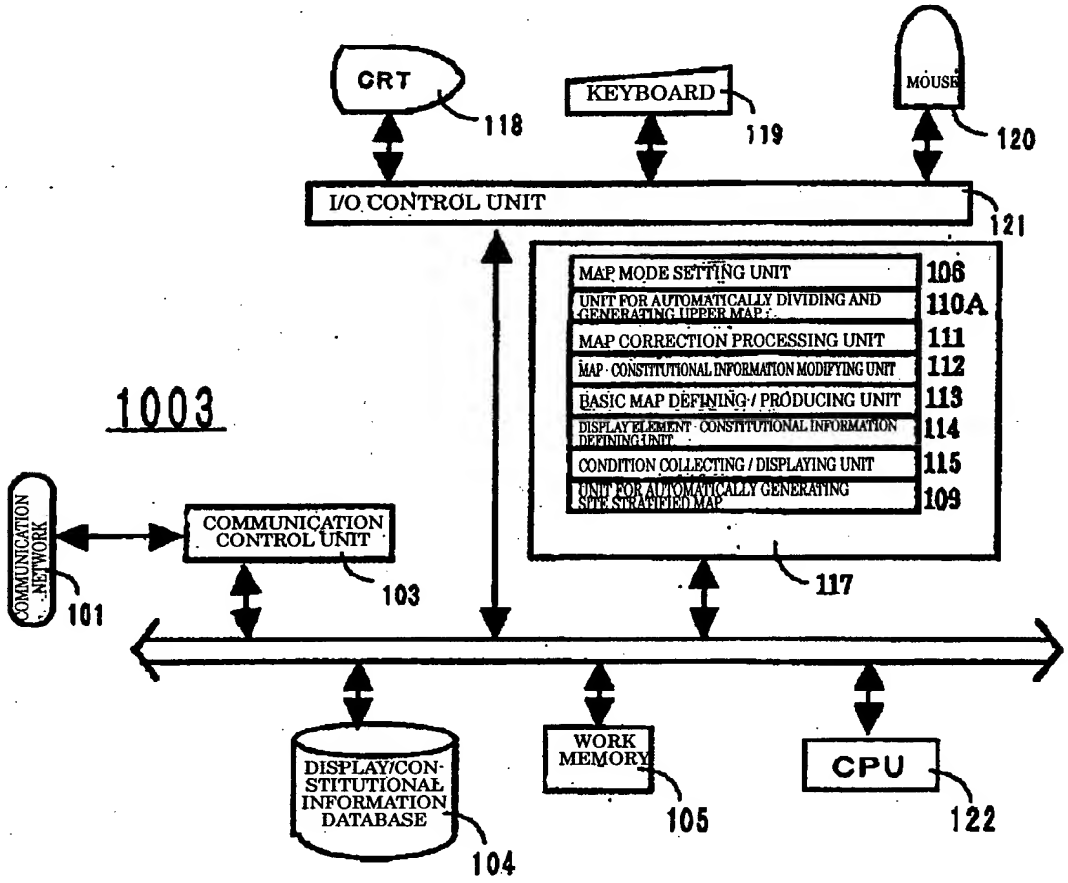


Fig.28

PROCESSES FOR AUTOMATICALLY GENERATING SITE STRATIFIED MAP

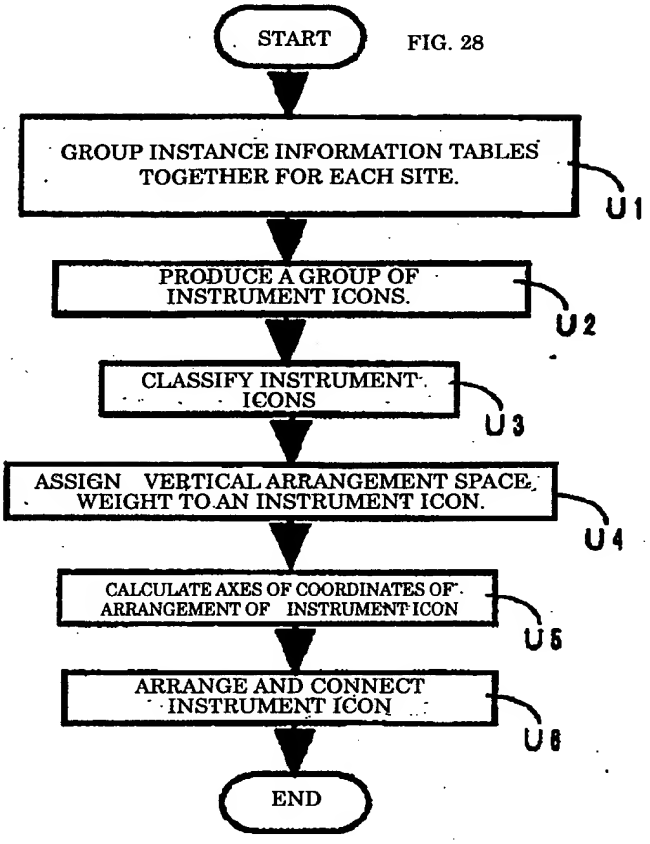


Fig.31

EXAMPLE OF DISPLAYING LAYOUT FOR AUTOMATICALLY GENERATING SITE STRATIFIED MAP (FIG. 31)

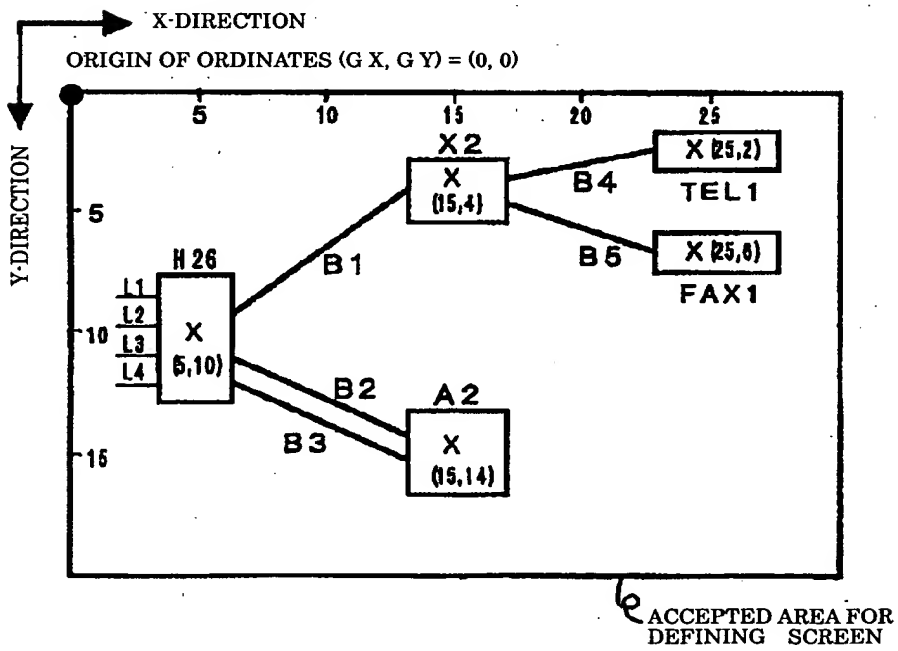
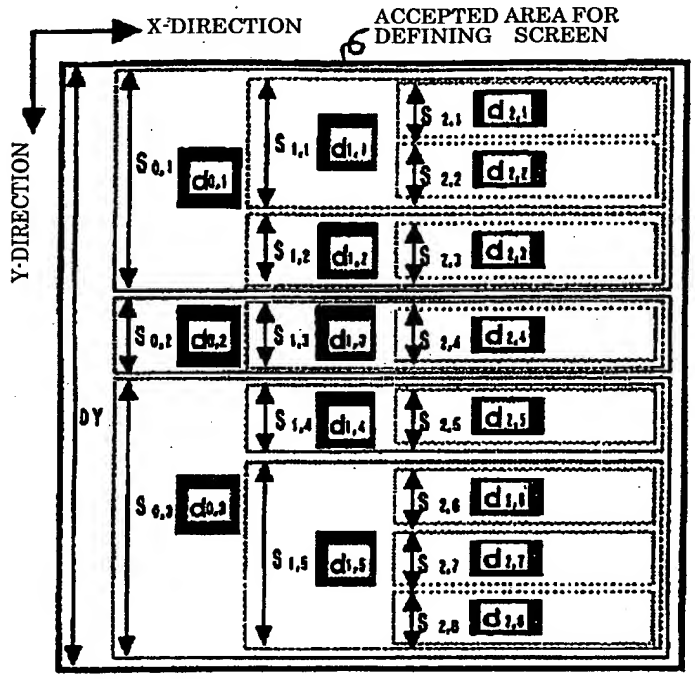


Fig.30

METHOD FOR DIVIDING ARRANGEMENT SPACE (Y-AXIS-DIRECTION)(FIG.30)



(NOTES)

$$S_{0,1} = S_{1,1} + S_{1,2} = S_{1,1} + S_{2,2} + S_{2,3}$$
$$S_{0,2} = S_{1,3} = S_{2,4}$$
$$S_{0,3} = S_{1,4} + S_{1,5} = S_{2,5} + S_{2,6} + S_{2,7} + S_{2,8}$$
$$DY = S_{0,1} + S_{0,2} + S_{0,3}$$

Fig.32

CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 32)

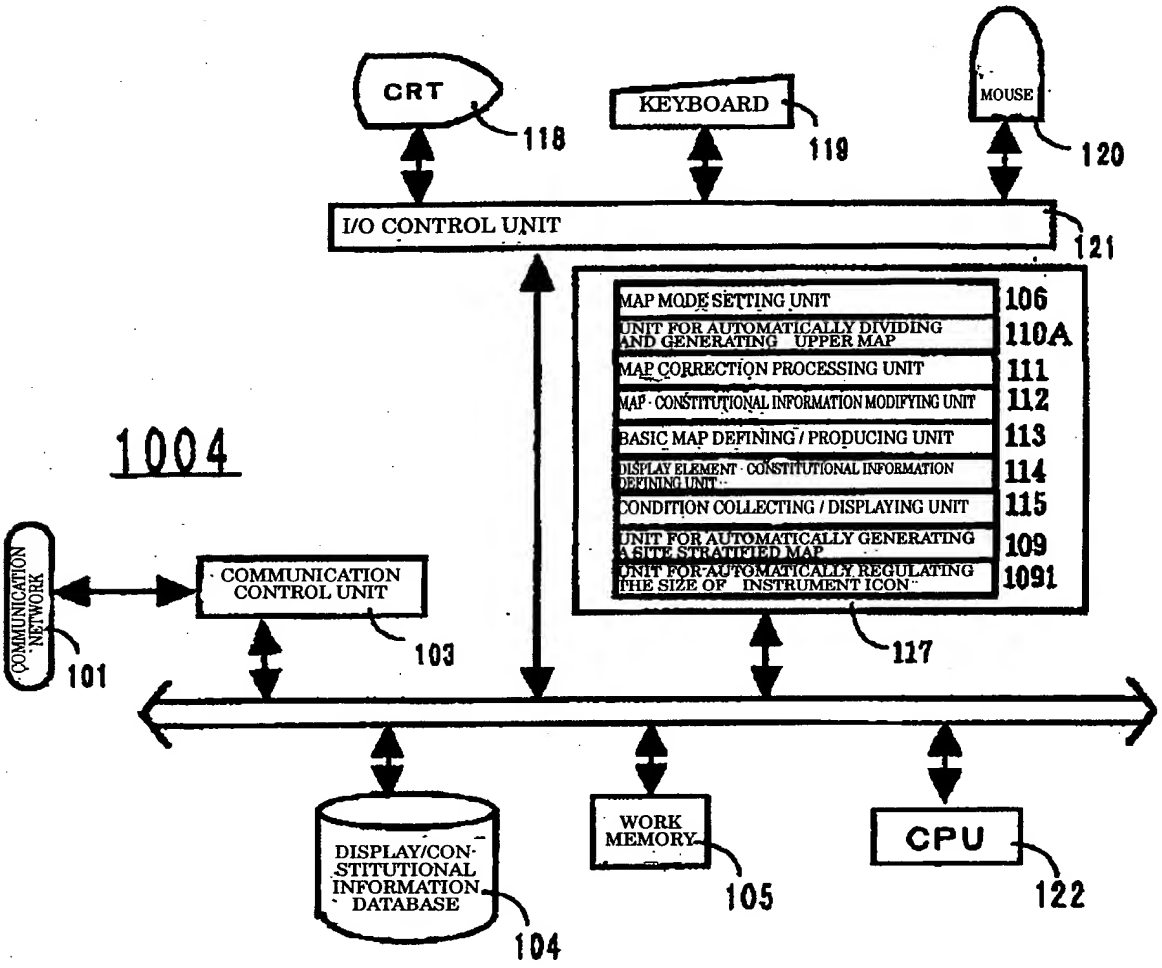


Fig.33

EXAMPLE OF ADJUSTING AND ARRANGING SIZE OF DISPLAY ICON (FIG. 33)

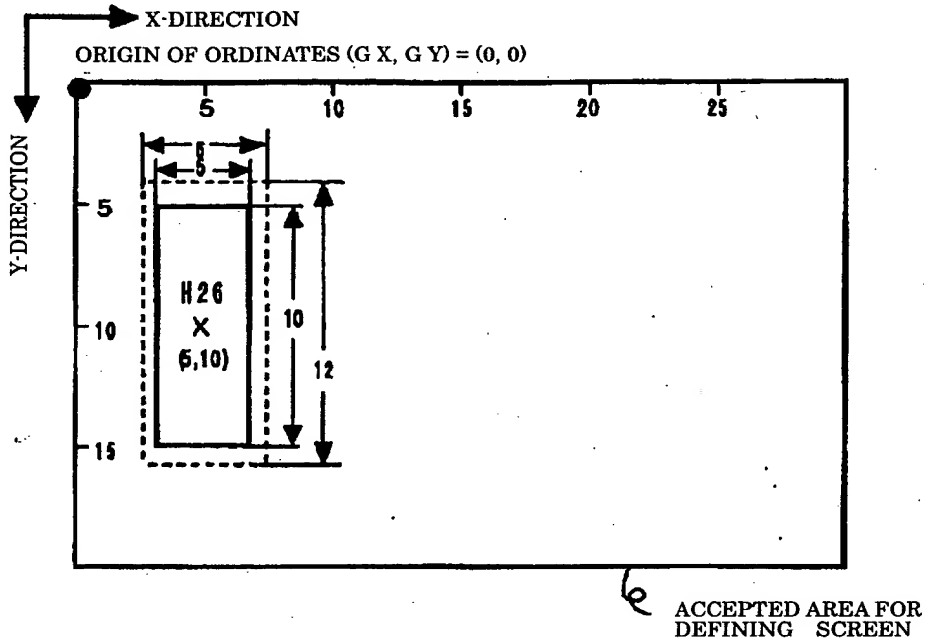


Fig.35

EXAMPLE OF LOWER MAP PRODUCING GUIDANCE SCREEN (FIG. 35)

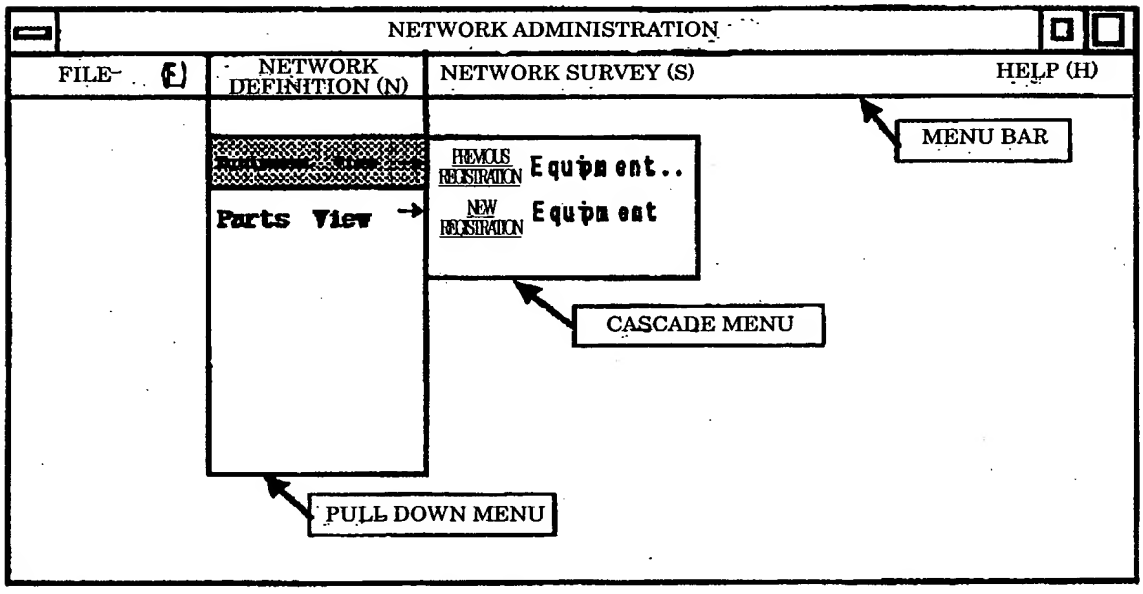


Fig.34

CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 34)

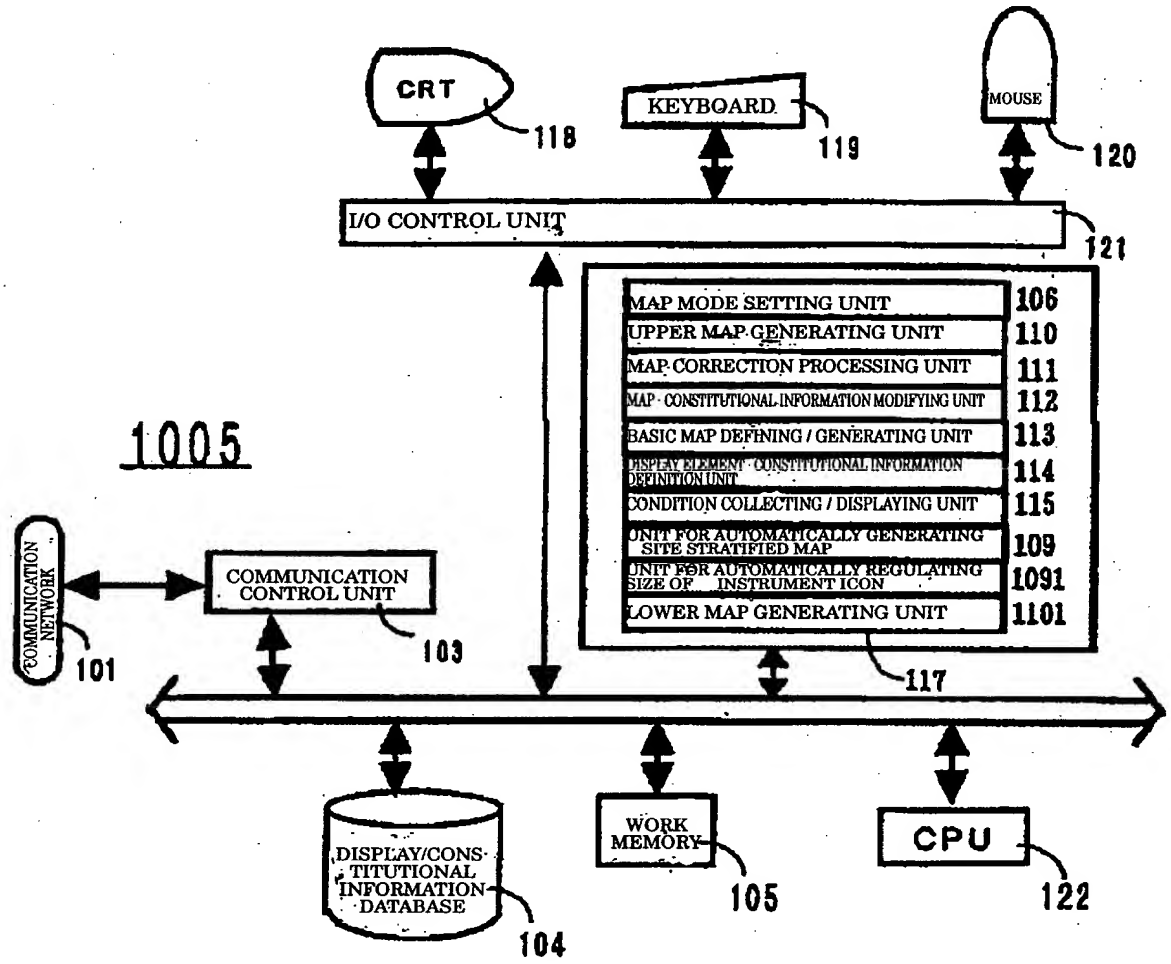


Fig.36

EXAMPLE OF GUIDANCE SCREEN FOR INSTRUMENT WITH VENDOR'S NAME (FIG. 36)

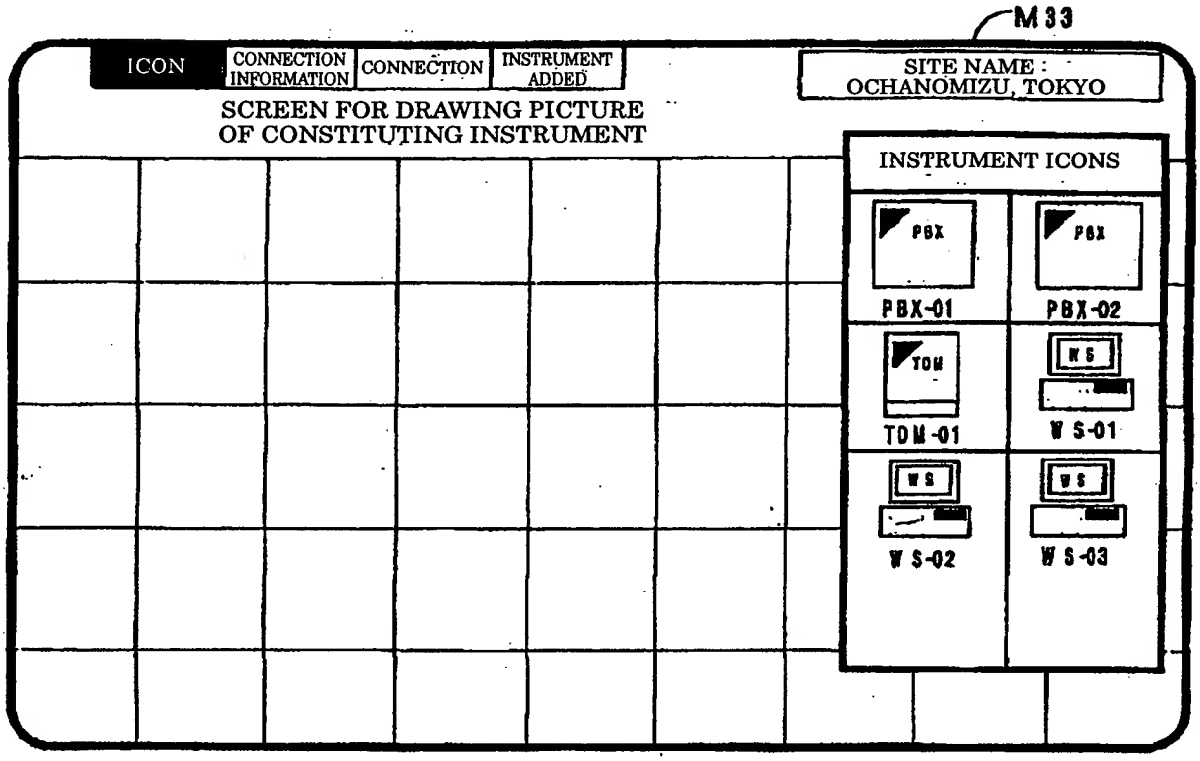


Fig.37

CONSTITUTIONAL DIAGRAM OF NETWORK ADMINISTRATION DISPLAYING SYSTEM (FIG. 37)

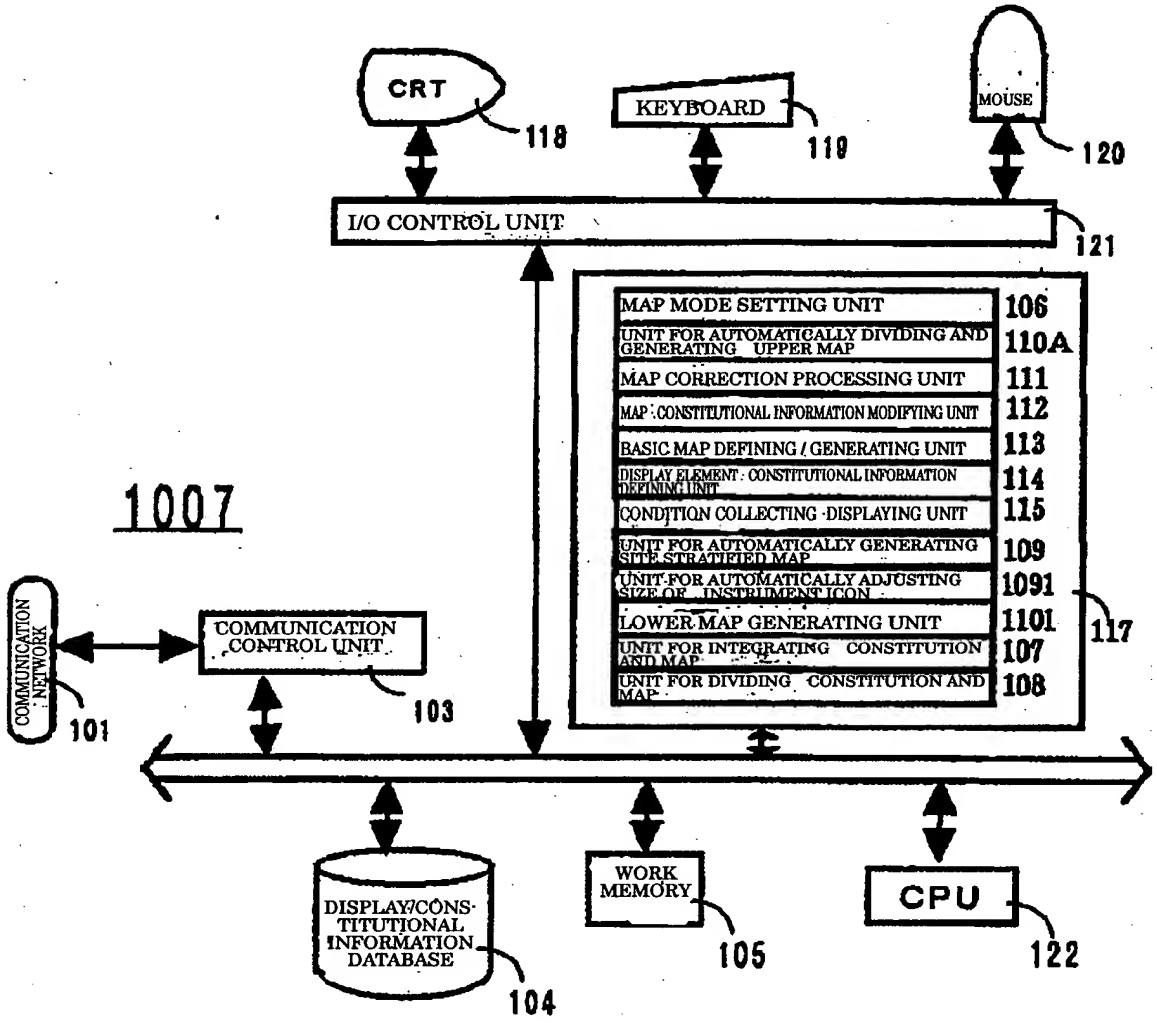
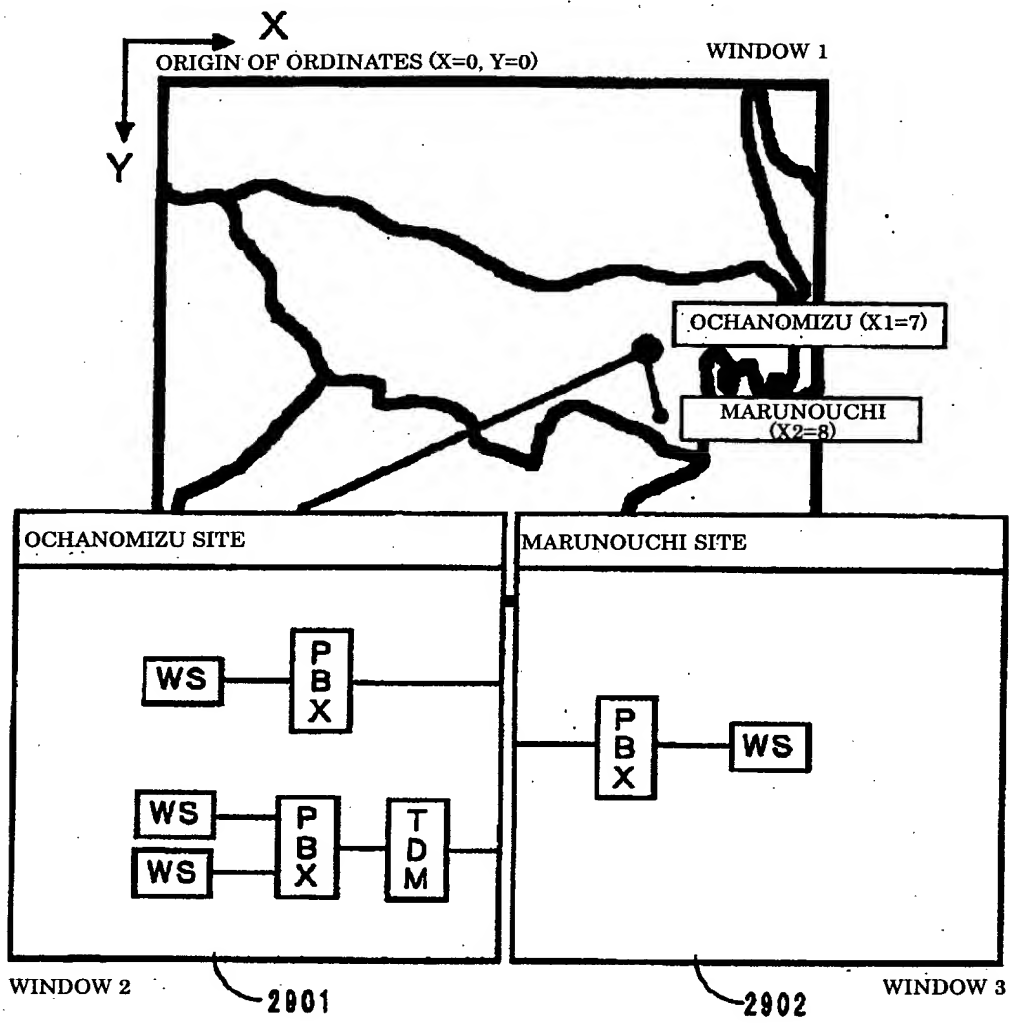


Fig.38

Site View EXAMPLE OF DISPLAYING SITE VIEW WINDOW (FIG. 38)